

FOOD AND HEALTH

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TEETH OF A CARNIVORE, A MAN AND A FRUGIVORE . 18

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FOOD AND HEALTH

CHAPTER I

IMPORTANCE OF DIET

"The first wealth is health."—R. W. EMERSON.

"Amongst the many problems awaiting solution, none is of greater importance for the welfare of the individual and of the race than that which relates to the proper nutrition of the body."
—Prof. CHITTENDEN

"The health and strength of all are intimately dependent upon their diet. Yet most people understand very little about what their food contains, how it nourishes them, whether they are economical or wasteful in buying and preparing it for use, and whether or not the food they eat is rightly fitted to the demands of their bodies. The result of this ignorance is great waste in the purchase and use of food, loss of money, and injury to health."—Prof. ATWATER

"I have come to the conclusion that a proportion amounting at least to more than one half of the chronic complaints which embitter the middle and latter part of life . . . is due to avoidable errors in diet."—Sir WILLIAM THOMPSON

ONE of the many problems to which the attention of thoughtful and observant people is being directed more and more every day is the question of food and drink—*i.e.* the questions of how, what, how much, and when to eat and drink, so as to secure the maximum of physical health and efficiency and enjoyment of life. Health and enjoyment of life are the two objects which most of the world is seeking ;

enjoyment of life is possible to few without health, while health by itself is often a source of enjoyment to many. It needs no argument then to emphasise the vital importance of health to everyone.

That a large section of the British community realises that its health is very far from being what it ought to be, and what they would like it to be, is clearly proved, if proof were needed, by the multitude of nostrums which are offered to the public ; innumerable patent medicines, pills, tabloids, waters, "cures," treatments, and so on, we find heavily advertised on every hand, and the large fortunes which have been, and are still, made by the sale of these innumerable remedies, afford evidence of the large numbers of those seeking a way to better health.

The following few facts show that there is only too good reason to be dissatisfied with the present state of the health of the community as a whole. The figures of the Registrar General show that, of people over the age of 35, 1 man in 12, and 1 woman in 8, dies of that terrible disease cancer ; in 1906 more than 31,000, or 1 in 17 of the total deaths, were officially returned as due to cancer, and the Report states that the increase of this disease has been "rapid and practically steady" for the last half century, the deaths in 1906 being the highest on record. In the same year nearly 57,000 persons died of tuberculosis, which means that more than one-tenth of the whole population dies of this disease. The number of lunatics is increasing every year, one person in every 283 in Great Britain being in 1906 officially returned as insane, and it is well known that there are many more whose names do not find

their way into the returns. Out of 10,000 men who volunteered in Manchester for service in South Africa, although 3000 were accepted, only 1200 came up to the normal regulation standard—*i.e.* out of every 100 young men—presumably active and vigorous, or they would not have volunteered—only 12, or 1 out of 8, came up to standard: and moreover this standard has been reduced very considerably during the last half century; thus, for height, the standard in 1845 was 5 feet 6 inches, in 1872 it was 5 feet 5 inches, in 1883 it was 5 feet 2 inches, and in 1897 and 1901 it was 5 feet for “specials.” Of all the men who applied for enlistment in 1900, and were medically examined, 28 per cent. were rejected as physically unfit; allowing for “specials”—*i.e.* for those who, though not up to standard, are accepted in the hope that they will come up to standard later on—the percentage of unfit is probably, as Seebohm Rowntree points out, nearer 50 per cent. Figures produced before the House of Commons in 1908 showed that out of 34,808 men who offered for enlistment in ten of the principal towns of England and Wales, 16,297, or 42 per cent., were rejected as physically unfit to be soldiers. These figures indicate an even worse state of affairs than at first appears, because “all officers concerned in recruiting have instructions not to send a recruit up for medical examination unless there is a reasonable probability of his passing” (from the Report of the Inspector General of Recruiting).

Doctors report that in London schools 25 per cent. of the children are anæmic, 8 per cent. have heart disease, and 45 per cent. have adenoids or

other throat and nose troubles. Even among the well-to-do classes the condition of the children is far from being satisfactory. Thus a doctor, in *The Times* of 24th October 1898, gave an account of the state of the last 100 boys admitted to one of the great English schools. The examination was made a few days after admission, and "was as carefully and thoroughly performed as if each life were about to be insured for a large sum of money." "The boys were typically healthy lads between 13 and 15 years of age, and in most cases the parents were not cognisant of any bodily defect in their sons." "They may be reasonably accepted as probably typical of any other set of boys of like position and training, similarly collected without choice or discrimination." The examination showed that "deformities" amounted to 63 per cent., and "they comprised lateral curvature of the spine, pigeon-breast, knock-knee, and flat-foot," and other minor congenital malformations: 20 per cent. had defective sight: 9 per cent. were defective of hearing: 22 per cent. had albuminuria: the chest measurement of 68 per cent. was below the average: and this average, be it noted, is getting less every year: the average of fifty years ago is quite out of reach to-day. In addition to these more serious defects, there were also such "minor imperfections as stammering, tendency to chilblains, defective teeth, and many other failings."

Another fact pointing to the unhealthy condition of the community is the existence of thousands of doctors in our midst, and specialists for particular diseases, who find abundant work to occupy them, and whose ingenuity is taxed to invent new names

for the new diseases which are almost daily being discovered. The Report of the Registrar General for 1906 shows that only 6·5 per cent., or less than 1 in 15, of the total deaths (excluding violent ones) are returned as due to old age, all the rest being ascribed to some disease or other. The figures show that:—

1 person in 7 dies before he reaches the age of 1 year.						
I	”	5	”	”	”	2 years.
I	”	4	”	”	”	5 years.
I	”	3	”	”	”	25 years.
I	”	2	”	”	”	49 years.

Thus parents with a family of nine children must expect, if they have average luck, to lose one of them before he is 12 months old, another before he reaches 5, and a third before he reaches 25 years of age, while only half the family will ever reach the age of 50. Few there are in these days who

“ . . . live, till like ripe fruit they drop
 Into their mother's lap, or be with ease
 Gathered, not harshly plucked, for death mature.”
(Paradise Lost, Book XI.)

Similar facts might be multiplied almost indefinitely; but, not to labour the point unnecessarily, a small selection only has been given. Some people, however, will urge that these figures represent only the weaklings, the failures, the “elimination of the unfit,” and that the bulk of men are healthy enough. A little consideration, however, will show that, these figures being what they are, the majority of men are not properly healthy. The conditions which produce disease and premature death in so many are

the same for all, and even those who manage to avoid disease, and to survive, suffer in health proportionately, through the exhaustion of much of their strength in fighting the disease conditions. As the late Lord Playfair said, "the record of deaths only registers, as it were, the wrecks which strew the shore, but it gives no account of the vessels which are tossed in the billows of sickness, stranded and maimed, as they often are, by the effects of recurrent storms." Again, intermarriage between those who are unhealthy and diseased and those who are comparatively healthy and sound, prejudicially affects the health of the children, and in this way disease rapidly spreads throughout a nation, leading to a lowering of the standard of general health and vitality. That the standard of health of those who are generally credited with being fairly healthy and strong is a low one, can be demonstrated any day in the week by anyone who will ask the first dozen acquaintances he meets how they are; how many of them will say they are a little "out of sorts," "not quite up to the mark," "seedy" or "poorly," "so-so," "a bit chippy," a shade "off colour," or a little better (showing that they have just been unwell), or that they have a cold in the head, or sore throat, or a touch of influenza, or a headache, or twinges of rheumatism or neuralgia, or an attack of diarrhoea or constipation, or a fit of biliousness or "liver," or some other minor complaint. How many too will there be who can truthfully say that they have overflowing health and strength and have no uncomfortable feeling or ache or pain in their whole body? One feels inclined to say, with Heubner, "our generation has become so

enfeebled, is tormented by such an innumerable host of sufferings, large and small, that we might, Diogenes like, look for a human being that may be described as 'sound to the core' and free from any infirmity, with a lamp in broad daylight."

Trifling though petty ailments of the class of those enumerated may be, they have yet an important bearing on life; for everyone knows what a difference a cold in the head, or a touch of "liver," etc., etc., makes to a man's comfort, temper, work and general enjoyment of life. But, so reconciled are people in these days to being the victims of petty indispositions, that the latter are now looked upon as part of the natural order of things, as part of the "ills that flesh is [necessarily ?] heir to." Hence a person who is seedy or out of sorts is looked upon with sympathy by all, and the thought seldom occurs to people to blame the person, as he would generally be blamed if it had been his horse, or his cattle, instead of his own body, that had got out of condition.

The fact of the matter is that men treat their own bodies in a way quite different from that in which they treat their animals. In the case of the latter, knowing from experience how intimately their health and strength are dependent upon their food, men consider with care and attention all matters relating to their feeding: the kind of food best for them, the amount of it that is best for them, and the best times for them to have it. But their own bodies they treat in quite a different way. In feeding themselves, all that the vast majority of men demand is, that the food should be as attractive and appetising to the eye, and as pleasing to the palate, as possible.

Seldom or never does it occur to people to consider whether the food they eat is really suited, in quantity and in quality, to fulfil the functions that it has to perform in the human organism, or to make any scientific study, however elementary, of the chemical constituents of food substances, and their food value, in the same way, or in the same spirit, as is done in the case of animals. And yet, if it is necessary, as we know from experience it is, to pay careful attention to all matters concerning the feeding of animals, in order to keep them in the maximum of health and efficiency, much more must it be necessary to do so for human beings; for even domestic animals still have powerful instincts which guide them, and keep them out of serious danger in matters of food and drink. But men, on the other hand, in "civilised" countries at least, live in such artificial surroundings, eat such artificial foods, and indulge in so many artificial devices — condiments, flavourings, *et hoc genus omne*—in order to stimulate and tempt a jaded and depraved appetite, that any natural instincts which they, presumably, once possessed in common with all other animals, have long ago become perverted or lost. For no one can reasonably contend that it is an instinct implanted in man by nature which guides him to seek nourishment in the various elaborate and often highly indigestible preparations found at an ordinary table. In fact, we know that in animals natural instinct teaches them to avoid harmful substances, whereas civilised men frequently prefer the very foods which they know are distinctly injurious to them; hence the saying of children that "whatever is real nice is either wicked or indigestible."

It is, of course, as Mrs Hodgkinson says, a commonplace that taste can be depraved or educated in almost any direction. Thus, for instance, in Korea dogs are raised for food: snails and frogs are eaten in France: the Roman garum, the most celebrated sauce of antiquity, was prepared from the half-putrid intestines of fish: a rotten egg, especially if accompanied by the chick, is highly esteemed by the Siamese: Hottentots consider the entrails of animals delicate eating: Zulus are very fond of decomposed flesh with the worms in it: amongst ourselves game which has commenced to putrefy, and which we euphemistically term "high," is considered a delicacy: many people eat cheese that is decayed, and a crawling mass of insects: and so on.

Again, the adverse conditions of modern life, such as the polluted atmosphere of large towns and ill-ventilated houses, the difficulty in getting regular and healthy exercise, and so on, are such as to make it more than ever necessary for men living under such conditions to counteract and minimise as far as possible the effects of the latter by paying attention to such matters—of which diet is one—which they have the power, within limits, to control.

As already said, however, it is unfortunately only too true that the average man has practically no knowledge, worthy of the name, about the food he habitually eats, and its suitability for the purpose to which he puts it. As one writer says, "reason seems to have about as little to do with a man's diet as with his politics or the shape of his hat." In fact it is quite common to hear people ridicule as pedantic the mere suggestion that one should have even an

elementary acquaintance with the value and properties of different food substances or with the principles of human nutrition. Such people sometimes boast that they can "eat and drink anything, and enjoy it too." No doubt they can do so, if they choose ; but is there any sense or reason in doing so? A man who followed such a haphazard method as this in selecting food for his animals, or even in keeping his machines supplied with fuel, oil, etc., would be looked upon by all as a careless and foolish owner, and he would receive scant sympathy when his animals got out of condition or his machines out of order. The principle is surely the same for all—machines, animals, or men.

It would seem, therefore, perfectly legitimate to suspect (to use no stronger expression) that the complicated, elaborate and highly artificial dietary of the present day, the outcome as it is, not of any knowledge or science of foods and their properties, but almost entirely of a blind following of the whims of custom and convention, and the dictates of a capricious palate, may be largely responsible for the terrible amount of disease, sickness and ill-health with which the nation is permeated.

But the question that naturally arises in one's mind is—what have our scientists and doctors been doing all the time? Well may the question be asked: let those questioned answer for themselves. Strange as it may seem, it is yet a fact that diet, the science of feeding the human animal, does not form part of the ordinary curriculum of the medical student, but is merely an "extra" which may be taken up or left alone as the student pleases. Until

quite recently the labours of the physician have been directed almost entirely to studying diseases rather than health, abnormal conditions rather than normal ones; doctors have been trying to *cure* people who have become diseased, rather than to teach them how to *avoid* disease by keeping in health. Further, most of their efforts have been directed to treating serious and chronic diseases; they have laboured harder to find a *cure* for tuberculosis and cancer than they have to *prevent* headaches and indigestion. That the science of the physician is a science of disease rather than of health, is shown by the fact that doctors themselves, after making due allowance for their mode of life, are as a general rule no healthier than the rest of men. If the fields, crops and cattle of a professional farmer were no better than those of his amateur neighbours: if a lawyer were himself constantly involved in legal difficulties: if the cars of a motor expert got out of order just as much as those of his non-expert friends—we should have little faith in the knowledge or skill of the farmer, lawyer or motor expert. Logic compels us to come to a similar conclusion in regard to doctors—viz. that all their skill and technical knowledge, invaluable though it may be in treating disease, does not appear to give them any appreciable advantage over the ordinary layman in keeping their own bodies healthy and free from disease.

Within the last few years, however, the science of the physician has taken a new direction, and doctors, in addition to studying diseases, are also trying to find out the causes which make diseases possible. One of these causes—perhaps the chief one, certainly

one of the most important ones—is wrong feeding ; and this fact is beginning to dawn on an increasing section, not only of the medical profession, but also of the general public. The fact mentioned above, that medical men as a body are no better able to keep in health than an ordinary layman, is offered as a justification for the present attempt by a layman to arrive at a partial solution of some of the many problems in the science of feeding the human animal.

CHAPTER II

THE NATURAL CONSTITUTION OF MAN

"No ordinance of man can override
The settled laws of nature and of food,
Not written there in pages of a book,
Nor were they framed to-day, or yesterday:
We know not whence they are, but this we know,
That they from all eternity have been,
And shall to all eternity endure."

SOPHOCLES

IN attacking the problem of diet and health, the first point to be settled is the kind of food best suited to man's natural constitution—*i.e.* it is necessary to ascertain, from an examination of man's general structure, his teeth, the disposition of his digestive organs, and so on, the food for which he was designed by nature. This matter is evidently a technical one, for which it will be well to refer to those who have made a speciality of this branch of knowledge. The following are a few extracts from well-known scientists bearing on the point.

Dr Anna Kingsford, in her book "The Perfect Way in Diet," after comparing the structure and organs of man in some detail with those of other members of the animal kingdom, says :

"If we have consecrated to this sketch of comparative anatomy and physiology a paragraph which may seem a little wearisome in detail, it is because

it appears necessary to combat certain erroneous impressions affecting the structure of man which obtain credence, not only in the vulgar world, but even among otherwise instructed persons. How many times, for instance, have we not heard people speak with all the authority of conviction about the 'canine teeth' and 'simple stomach' of man, as certain evidence of his natural adaptation for a flesh diet. At least we have demonstrated one fact; that if such arguments are valid, they apply with even greater force to the anthropoid apes—whose 'canine teeth' are much longer and more powerful than those of man—and the scientists must make haste therefore to announce a rectification of their present division of the Animal Kingdom in order to class with the carnivora and their proximate species, all those animals which now make up the order of Primates. And yet, with the solitary exception of man, there is not one of these last which does not in the natural condition absolutely refuse to feed on flesh; M. Pouchet observes that all the details of the digestive apparatus in man, as well as his dentition, constitute so many proofs of his frugivorous origin—an opinion shared by Professor Owen, who remarks that the anthropoids and all the quadrumana derive their alimentation from fruits, grass and other succulent and nutritive vegetable substances, and that the strict analogy which exists between the structure of these animals and that of man clearly demonstrates his frugivorous nature. This is also the view taken by Cuvier, Linnæus, Professor Lawrence, Charles Bell, Gassendi, Flourens, and a great number of other eminent writers. The last named scientist gives expression to his views after the following manner:—

“‘Man is neither carnivorous nor herbivorous. He has neither the teeth of the cud-chewers, nor their

four stomachs, nor their intestines. If we consider these organs in man, we must conclude him to be by nature and origin frugivorous, as is the ape.' ”

Other authorities have said as follows :—

“ It is, I think, not going too far to say that every fact connected with the human organisation goes to prove that man was originally formed a frugivorous animal. This opinion is derived principally from the formation of his teeth and digestive organs, as well as from the character of his skin and the general structure of his limbs.”—Prof. Sir CHARLES BELL, F.R.S., “ Anatomy, Physiology, and Diseases of the Teeth.”

“ It has been truly said that Man is frugivorous. All the details of his intestinal canal, and above all his dentition, prove it in the most decided manner.”—Dr F. A. POUCHET (Author of “ The Universe ”), “ Pluralité de la Race Humaine.”

“ The apes and monkeys, whom man nearly resembles in his dentition, derive their staple food from fruits, grain, the kernels of nuts, and other forms in which the most sapid and nutritious tissues of the vegetable kingdom are elaborated ; and the close resemblance between the quadrumanous and the human dentition shows that man was, from the beginning, adapted to eat the fruit of the garden.”—Prof. Sir JOHN OWEN, “ Odontography,” vol. i. Ed. 1845.

“ The body of man and that of the anthropoids are not only peculiarly similar,” says Hæckel, “ but they are practically one and the same in every important respect. The same 200 bones, in the same order and structure, make up our inner skeleton ;

the same 300 muscles effect our movements; the same hair clothes our skin; the same four-chambered heart is the central pulsometer in our circulation, the same 32 teeth are set in the same order in our jaws; the same salivary hepatic and gastric glands compass our digestion; the same reproductive organs ensure the maintenance of our race."—Prof. J. HOWARD MOORE (Chicago University), "The Universal Kinship."

"Comparative anatomy proves that man is naturally a frugivorous animal, formed to subsist upon fruits, seeds and farinaceous vegetables." — SYLVESTER GRAHAM, M.D.

"Certainly man was never made to be a carnivorous animal."—Prof. JOHN RAY, F.R.S.

"I was contending that from the conformation of our teeth we do not appear to be adapted by nature to the use of a flesh diet, since all animals whom nature has formed to feed on flesh have their teeth long, conical, sharp, uneven, and with intervals between them—of which kind are lions, tigers, wolves, dogs, cats and others. But those who are made to subsist only on herbs and fruits have their teeth short, blunt, close to one another, and distributed in even rows."—Prof. PIERRE GASSENDI, Letter to Van Helmont.

"The habit [of flesh eating] is *unnatural*, for it is a violation of the law of our being. Man is created a frugivorous, or fruit-eating creature. This scientific fact is evident from a comparison with the carnivorous animals, from whom he differs completely in respect of his internal organs, teeth, and external appearances, whereas, anatomically, he is most intimately allied to the anthropoid apes, whose diet

consists of fruits, cereals, and nuts."—Dr JOHN WOOD, M.D. (Oxon.), *Herald of the Golden Age*, November 1903.

"The teeth of man have not the slightest resemblance to those of carnivorous animals, and whether we consider the teeth, jaws, or digestive organs, the human structure closely resembles that of the frugivorous animals."—Prof. WM. LAWRENCE, F.R.S., Lecture on Comparative Anatomy, Ed. 1848.

"The natural food of man, judging from his structure, appears to consist principally of fruits, roots, and other succulent parts of vegetables. His hands afford every facility for gathering them; his short but moderately strong jaws on the one hand, and his canines being only equal in length to the other teeth together with his tuberculated molars on the other, would scarcely permit him either to masticate herbage, or to devour flesh were these condiments not previously prepared by cooking."—Prof. Baron CUVIER, "The Animal Kingdom," Ed. 1853.

"Comparative Anatomy teaches us that man resembles the frugivorous creatures in *everything*, the carnivorous in *nothing*. . . . It is only by softening and disguising dead flesh by culinary preparations that it is rendered susceptible of mastication or digestion, and that the sight of its bloody juices and raw horror does not excite loathing and disgust. . . .

"Man resembles no carnivorous animal. There is no exception, except man be one, to the rule of herbivorous animals having cellulated colons. The orang-outang perfectly resembles man both in the order and in the number of his teeth.

"The orang-outang is the most anthropomorphous

[man-like] of the ape tribe, all of which are strictly frugivorous. There is no other species of animals which live on different foods in which this analogy exists."—Prof. Baron CUVIER, "Leçon d'Anatomie Comparative."

"Cannibalism is not an original instinct of man, for he, like the anthropoid apes, is, to judge by his teeth, a fruit eater and therefore not even intended for flesh eating."—Prof. H. SCHAAFHAUSEN.

"The Anthropoids and all the Quadrumana derive their alimentation from fruits, grains, and other succulent vegetable substances, and the strict analogy which exists between the structure of these animals and that of man, clearly demonstrates his frugivorous nature."—Sir RICHARD OWEN, F.R.S.

"At the period and place, whenever and wherever he was, when man first lost his hairy covering, he probably inhabited a hot country: a circumstance favourable for the frugivorous diet on which, judging from analogy, he subsisted."—CHARLES DARWIN, LL.D., F.R.S., "The Descent of Man."

"No physiologist would dispute with those who maintain that man ought to live on vegetarian diet."—Dr SPENCER THOMPSON.

The notion that the so-called "canine" teeth of man are evidence of his carnivorous nature is so widespread, that a picture is given of the teeth of a carnivore (leopard), a man, and a frugivore (orang-outang). It will be noticed that the teeth of the carnivore have a sharp, jagged, cutting edge suited for tearing flesh, while those of the frugivore have a more or less rough surface suited for crushing and

LEOPARD
SIDE VIEW



BITTING EDGES



MAN
SIDE VIEW



BITING SURFACE



ORANG,
SIDE VIEW



BITING SURFACE



TEETH OF CARNIVORE, MAN, AND FRUGIVORE FOR COMPARISON
 REPRODUCED BY KIND PERMISSION OF THE LONDON AND WESTMINSTER MEDICAL AND DENTAL SOCIETY, FROM HIS DIET AND FOOD

grinding. The close resemblance between the teeth of the frugivore and those of man is apparent.

The above scientific evidence demonstrates the fact that the structure and constitution of man does *not* resemble in any way that of carnivorous or flesh-eating animals, but *does* very closely resemble that of frugivorous or fruit-eating animals; and, therefore, until and unless it can be shown that changed conditions of life and environment render another form of dietary more suitable, a diet of fruit, nuts, etc., would appear to be the one for which man's organism is best adapted by nature.

CHAPTER III

THE FUNCTIONS OF FOOD IN THE HUMAN ORGANISM

THE next point that we have to consider, in investigating the problem of diet, is the *rôle* which food has to play in the human organism, the uses to which it is put by man's digestive and assimilative machinery. This will involve the use of a few technical terms, but they will be so few, and so easy to understand, that it is hoped they will not frighten even the class of people who are in the habit of mentally shuddering at the mere sound or look of technical, scientific names or expressions of any kind. Many of the so-called sciences of the day, when stripped of their academic, text-book terrors of long names and formulæ, prove to be easily within the comprehension of any ordinarily intelligent person. Quite a few years ago it was common to hear people declare that motor cars would never be for them, because the complicated mechanism, etc., was quite beyond their powers of comprehension. Many of these people, however, are now owning and managing their own cars, and talk with glibness and enthusiasm about all the mechanical details and paraphernalia so dear to the hearts of motorists. The mechanism of the human engine is surely at least as interesting, and as well worth while to understand, as that of a motor car.

In order to get an idea of the purposes for which food is necessary, we cannot do better than take the old and useful analogy of the steam engine. The needs of a steam engine may be classed under three main heads : firstly, material to replace the wear and tear of the engine itself ; secondly, fuel to enable the engine to produce its power, and so to do useful work ; thirdly, materials to lubricate the engine and to keep it clean. The human body has also just these three main requirements. The bones, muscles, blood, etc., of the body correspond to the parts of a steam engine ; and just as use gradually wears out the parts of the engine and makes renewal necessary, so, as the human body performs the work of moving itself from place to place, of lifting weights, of moving its arms and legs, of breathing, of circulating its blood, of eating and digesting its food, and so on, its parts—*i.e.* its muscles, nerves, skin, blood, etc.—get worn out and require constant repair and renewal. Secondly, as the steam engine requires fuel in order to provide steam which will drive it and enable it to do work, so the human engine requires fuel to burn and provide the heat and energy necessary, both to keep up its own heat, and to enable it to use its muscles. The muscles by themselves are of no more use than an engine by itself ; fuel is essential to both in order that work may be done. Thirdly, as the engine requires to be lubricated and cleansed, so does the human body. The waste matter of the body, corresponding to the ashes, smoke and grit in the bearings of the engine, must be thoroughly and regularly got rid of, for if they are allowed to accumulate in the system they will not only clog it, and, by fouling the blood, prevent it from

nourishing the body and fulfilling its other functions, but they may, by their continued presence where they are not wanted, give rise to all kinds of disturbance and disease.

Leaving these broad generalities, let us now go a little more into details. First and foremost of all the needs of the organism for food comes *water*, which is indispensable in order to make good what is lost from the system in various ways. Secondly, to replace the wear and tear of the tissues, etc., a substance called *proteid* is necessary; the characteristic of proteid is that it contains nitrogen; it is therefore sometimes called nitrogenous matter; some of the best-known forms of proteid are the lean of flesh, the white of eggs, the casein of milk and cheese, the gluten of wheat; proteid is also sometimes called protein or albumen. In addition to proteid, for repairing wear and tear, various *mineral salts* are required, such as the combinations of lime, magnesia, potash, soda, iron, phosphorus, etc. Thirdly, heat and energy are derived from two main groups of substances—viz. *hydrocarbons* or fats and oils, and *carbohydrates* or sugars and starches; proteid also to a small extent helps in providing heat and energy, but we shall see later on that it is undesirable to use it for this purpose. These two groups, hydrocarbons and carbohydrates, contain carbon, hydrogen and oxygen, and it is by the combination of the carbon and hydrogen with oxygen that heat and energy are produced; in hydrocarbons both the carbon and hydrogen—in carbohydrates only the carbon—are available for producing heat and energy by combination with oxygen. Fourthly, for

what I have ventured to call lubricating and cleansing purposes, *mineral salts* are necessary, as well, of course, as water. The precise way in which these salts carry out their functions does not seem to be clearly understood by physiologists; suffice it to say that, in some way or other, they aid the processes of digestion, assimilation, excretion, etc.; that they enter into the composition of the various secretions of the body, and that they act as tonics, coolers and cleansers.

For the sake of clearness and ready reference the elements of food are arranged in tabular form as follows:—

FOOD ELEMENT	FUNCTION IT FULFILLS
WATER	Replaces that lost through the skin, lungs, intestines and kidneys.
PROTEID	Makes good wear and tear, and helps a little to provide heat and energy.
MINERAL SALTS	Make good wear and tear, assist digestion, excretion, etc.; keep blood pure; of first importance for nervous system, etc.
HYDROCARBONS (Fats and Oils) CARBOHYDRATES (Sugars and Starches) }	Provide fuel for heat and energy.

The order in the table may be taken as representing fairly well the order of importance of the four elements; water of course is the most necessary, as can be easily understood by remembering that it forms 71 per cent. by weight of the whole body, 22 per cent. of bones, 69 per cent. of liver, 72 per

cent. of skin, 75 per cent. of brain, 76 per cent. of muscles, 79 per cent. of blood and lungs, 99 per cent. of gastric juice, and $99\frac{1}{2}$ per cent. of saliva and sweat. Next after water comes proteid; the word is derived from the Greek "proteion" which means "pre-eminence." If proteid is not supplied in food, the wear and tear of the body is not made good, and in consequence the latter gradually wastes away. In order to emphasise the "pre-eminent" necessity for proteid, a few quotations from scientists on the point are given:

Prof. Bunge says that proteid substances are "the only organic food substances of which it can with certainty be affirmed that they are indispensable, and that they cannot be replaced by any other nutrient material."

Prof. Gamgee says "we may be deprived of starches and yet live. We may go without fats, but unless we have proteid we die."

Dr Robert Hutchison says "without proteid, life is impossible, for the daily wear and tear of tissue must somehow be made good. With proteid, plus water and some mineral salts, life can be healthily maintained for a practically indefinite time."

Prof. Sir Michael Foster says of proteid that we might manage on it alone with the help of a few "salts."

Mineral salts come after water and proteid in order of importance, and after them the heat and force producing elements—viz. hydrocarbons and carbohydrates, or fats, sugars and starches.

The next point to decide is the amount that is

required of these food elements. The whole question of the amount of food that is best for health will be dealt with in detail in a later chapter, but for our present purpose we will take what may be regarded as the orthodox standard—*i.e.* the standard that is laid down in the orthodox text-books and generally accepted by the bulk of medical men. Dr A. M. Davies gives as the daily requirement of an average man doing ordinary work :

	Oz.	PROPORTION
Proteid	4½	1·00
Fats	3	0·66
Sugars and Starches . .	14	3·10
Salts	1	0·22
Total	22½ oz.	per day.

Without at present laying too much stress on the total amount of food, as this is a point on which there will be a good deal to say later on, the reader is asked to note the *relative* amounts of the different elements ; the principal point to be observed is that about three times as much sugars and starches are required as is required of proteid.

CHAPTER IV

THE COMPOSITION OF FOOD SUBSTANCES

“Broadening intelligence on matters of food composition is called for on all sides.”—Prof. CHITTENDEN

HAVING obtained a general working knowledge of the elements of food required by the human organism, we are now in a position to examine with intelligent purpose the composition of such food substances as are available in nature for men’s sustenance. These consist of the products of the animal and vegetable kingdoms; for the products of the mineral kingdom, in their crude or unorganised form—*i.e.* before they have been assimilated by a vegetable organism—cannot be utilised as food by the human body.¹

The food substances of the vegetable kingdom consist of:

CEREALS—such as wheat, oats, barley, maize, rice, etc.

PULSES—such as beans, lentils, peas.

VEGETABLES—such as potatoes, onions, cauliflowers, carrots, cabbage, lettuce, tomatoes, etc.

FRUITS—such as dates, figs, grapes, plums, apples, pears, bananas, currants, oranges, etc.

NUTS—such as almonds, walnuts, chestnuts, coconuts, etc.

The products of the animal kingdom consist of:

¹ Table salt is a *doubtful* exception to this rule:

Fleshmeats of all kinds, fish, eggs, and milk and its products.

The percentage composition of some of the principal food substances is given in a table, which, for convenience of reference, has been placed in Appendix I., page 243. Such figures as these, however, are difficult to remember, and moreover, even if they could be remembered, they would not be of very much practical use in their present form. But for our present purpose there is no need to attempt to remember these figures; it is desirable, however, to have just a general and rough acquaintance with the *proportionate* values of the different classes of foods; to know, for instance, that there is a good deal of difference, from the food point of view, between a pound of flour and a pound of potatoes; because the flour contains five times as much proteid, and three and a half times as much total nutriment, as the potatoes do. At a later stage of this book it may be necessary to say something more about these figures, and to present them in a readier and more practical form. For our present purpose it will be sufficient if the reader will glance carefully through the following table and diagram. These have been constructed to show the mean composition of some of the principal and typical members of each group. The diagram is drawn to scale and represents graphically exactly the same as the table represents numerically.

The foods of each group, taken for the purpose of arriving at the mean composition of the groups, are as follows. The groups, and the foods in each group, are arranged in order of their richness in proteid.

VEGETABLE FOODS

PULSES—lentils, haricot beans, dried peas.

NUTS—almonds, filberts, brazil nuts, walnuts.

CEREALS—oatmeal, macaroni, wholemeal flour, rice, barley.

DRIED FRUITS—dates, figs, raisins, prunes.

VEGETABLES—potatoes, cauliflowers, tomatoes, leeks, turnips, carrots.

FRESH FRUITS—grapes, bananas, strawberries, apples.

ANIMAL FOODS

CHEESE—cheddar.

FLESHMEATS—chicken, lean beef, veal, medium fat mutton, fat pork.

EGGS.

FISH—sole.

MILK.

TABLE OF MEAN PERCENTAGE COMPOSITION OF
FOOD GROUPS

(N.B.—This analysis applies of course to foods in their raw, uncooked state.)

FOOD SUBSTANCE	Proteid	Hydro- carbons or Fats	Carbo- hydrates or Sugars and Starches	Mineral Salts	Water	Total Solid Nutri- ment
Pulses . .	25.1	2.3	55.8	2.8	10.2	85.6
Nuts . .	18.5	51.6	9.6	2.4	26.2	82.2
Cereals . .	10.6	2.3	72.5	2.1	12.0	87.8
Dried Fruits .	4.4	1.6	68.7	2.4	19.7	77.1
Vegetables .	1.4	0.3	8.6	0.8	87.7	11.1
Fresh Fruits .	1.0	0.9	16.0	0.6	81.4	18.5
Cheese . .	28.4	31.0	0.0	4.5	36.0	64.0
Fleshmeats .	17.0	17.9	0.0	2.1	62.9	37.0
Eggs . .	14.0	10.5	0.0	1.5	64.0	26.0
Fish . .	11.9	0.2	0.0	1.2	86.1	13.3
Milk . .	4.0	3.9	5.2	0.8	86.5	11.8

SAME TABLE IN DIAGRAMMATIC FORM

The horizontal lines show the percentage amounts of each constituent in the different foods, the distance between the vertical lines being equal to 100 parts

	PROTEID	HYDRO-CARBONS OR FATS	CARBO-HYDRATES SUGARS & STARCHES	WATER	TOTAL SOLID NUTRIMENT	MINERAL SALTS %
<u>VEGETABLE FOODS</u>						
Pulses	—		—	—	—	—
Nuts	—		—	—	—	—
Cereals	—	—	—	—	—	—
Dried Fruits.	—	—	—	—	—	—
Vegetables ..	—	—	—	—	—	—
Fresh Fruits.	—	—	—	—	—	—
<u>ANIMAL FOODS</u>						
Cheese	—	—		—	—	—
Fleshmeats*..	—	—		—	—	—
Eggs	—	—		—	—	—
Fish	—	—		—	—	—
Milk	—	—	—	—	—	—

* The amount of fat in Fleshmeats varies considerably.

* In order to make them visible, the amounts of Mineral Salts have been magnified 10 times.

It will be remembered that we saw on page 25 that the daily requirements of a man for food are roughly :

	Oz.	PROPORTION
Proteid	4 $\frac{1}{2}$	3
Fats	3	2
Sugars and Starches . .	14	9
Salts	1	$\frac{2}{3}$

Glancing at the diagram, there are two salient points which strike one at once, and one of the principal reasons why the reader has been burdened with figures at this stage is that he might be able to observe these points for himself, because they are very important ones. They are :

First, that the foods of the animal kingdom, with the one exception of milk, are not complete foods for men—*i.e.* they do not contain *all* the constituents that are necessary, as enumerated in above table. They contain a large proportion of proteid, as well as fat and salts, but they are entirely lacking in sugars and starches. Remembering that sugars and starches are the most important heat and force producing elements, and that three times as much of them is required as of proteid, and nearly double as much as of proteid and fats put together, it is evident that this is a very serious deficiency in animal foods. In order to make the diet complete, recourse must be had to the vegetable kingdom for all the sugars and starches. But we cannot get our sugars and starches from vegetable foods without at the same time getting the proteid which these foods contain ; and, owing to the large amount of sugars and starches

required, the proteid that must necessarily accompany them will be considerable ; in other words, in supplying the sugars and starches, we shall also supply much, if not all, of the proteid. There will, therefore, be no room for animal foods beyond the comparatively small amount which may be taken in order to bring the proteid up to the full allowance. That is to say, vegetable foods must form the great bulk of the daily ration ; if much animal food is taken, there will be excess of proteid, and this of course is undesirable, not only because all excess is undesirable, but for special reasons which will appear presently.

The second point is, that the foods of the vegetable kingdom are complete foods in every respect. In addition to this, a glance at the diagram shows that the amounts of the different constituents are more or less in the same proportion in the foods as they are in the table of daily requirements. Thus, in the dietary table fats are the least required, and they are also the least in the foods : the amount of proteid required in the dietary is more than the fats and much less than the sugars and starches, exactly as is found in the food table ; lastly, sugars and starches are the elements of which most is required in the dietary table, and they are also those most abundant in the food table.

It has been necessary to make these two points, first, that flesh foods are by no means complete foods in themselves, and second that vegetable foods do furnish foods complete in every respect, perfectly clear, and to present the facts so that every reader can see and judge for himself that they are clear,

in view of the popular ignorance which prevails among so many people as to the comparative merits of animal and vegetable foods. In order, however, that no doubt may be possible in anybody's mind, and to confirm the truth of the conclusions which we have ourselves drawn from the figures, a few quotations bearing on the subject are given from some of our leading scientists:

"Chemically speaking, flesh food is not necessary."
—Prof. A. WYNTER BLYTH, F.R.C.S.

"Every element, whether mineral or organic, which is required for nutrition, is found in the vegetable kingdom."—EDWARD SMITH, M.B., F.R.S., LL.B.

"It may indeed be doubted whether butcher's meat is anywhere a necessity of life."—ADAM SMITH, F.R.S.

"Animal diet is not essential to man."—LORD PLAYFAIR, M.D., C.B.

"It is a vulgar error to regard meat in any form as necessary to life. All that is necessary to the human body can be supplied by the vegetable kingdom. . . . The vegetarian can extract from his food all the principles necessary for the growth and support of the body, as well as for the production of heat and force. It must be admitted as a fact beyond all question that some persons are stronger and more healthy who live on that food. I know how much of the prevailing meat diet is not merely a wasteful extravagance, but a source of serious evil to the consumer."—Sir HENRY THOMPSON, M.D., F.R.C.S.

"Chemistry is not antagonistic to Vegetarianism any more than Biology. Flesh food is certainly not

necessary to supply the nitrogenous products required for the repair of tissue, therefore a well-selected diet from the vegetable kingdom is perfectly fit, from a chemical point of view, for the nutrition of men."—Dr F. J. SYKES, B.Sc., Med. Offr. for St Pancras.

"Meat is absolutely unnecessary for a perfectly healthy existence, and the best work can be done on a vegetarian diet. . . . I have not the slightest hesitation in saying that men may and do live in full health and vigour on a *carefully selected* dietary from which flesh food is excluded. . . . I say this, although I am not a Vegetarian or Fruitarian myself."—Prof. G. SIMS WOODHEAD, M.D., F.R.C.P., F.R.S.

"That it is easily possible to sustain life on the products of the vegetable kingdom needs no demonstration for physiologists, even if a majority of the human race were not constantly engaged in demonstrating it, and my researches show not only that it is possible, but that it is infinitely preferable in every way, and produces superior powers both of mind and body."—Dr ALEX. HAIG, F.R.C.P.

"There is ample and unexceptionable evidence that where neither milk nor any of its preparations are in ordinary use a regimen consisting of bread and fruits and herbs, is quite adequate to the wants of a population subsisting by severe and constant toil."—Dr W. B. CARPENTER, C.B., F.R.S.

"As a medical man I desire to add my testimony both from the results of personal experience, and from observations throughout many years of hospital and private practice. I maintain that flesh-eating is *unnecessary, unnatural and unwholesome*."—Dr JOHN WOOD, M.D.

“ . . . There is the chemical fact in the hands of all, which none can gainsay, that the products of the vegetable kingdom contain all that is necessary for the fullest sustenance of human life.”—Dr JOSIAH OLDFIELD, D.C.L., M.A., M.R.C.S., L.R.C.P.

“ It must be honestly admitted that weight by weight vegetable substances, when they are carefully selected, possess the most striking advantages over animal food in nutritive value. . . . I should like to see the vegetarian and fruit-living plan brought into general use, and I believe it will be.”—Sir BENJAMIN W. RICHARDSON, M.D., F.R.C.S.

“ That men can be perfectly nourished, and that their physical and intellectual capabilities can be fully developed in any climate by a diet purely vegetable, has been proved by such abundant experience that it will not be necessary to adduce any formal arguments on the subject.”—Sir WILLIAM LAWRENCE, in Rees' *Encyclopædia*.

“ Man can obtain from vegetables the nutriment necessary for his maintenance in health.”—*British Medical Journal*.

The verdict of science on the matter of the adequacy of vegetable foods to furnish all that is necessary for the nutrition of man is so emphatic, and so unmistakable, that it is astonishing how so many people are still under the delusion that flesh food is essential for existence. It is the more remarkable that this idea should be held, when the greater portion of the human race, as we shall see in the next chapter, are at the present moment, and have been for ages, living without the use of fleshmeat. It is surely, therefore, not exaggerating the case in the

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least to say that those who still hold that fleshmeat is necessary for existence are simply making, as Sir Henry Thompson put it, a "vulgar error," due to ignorance of facts.

It will be convenient at this point to very briefly examine the dietary of an ordinary Britisher. The following is an analysis of a fairly typical, modern, fashionable "good" dinner; the amounts given are such as an ordinary person, with a fair appetite, might take :

ANALYSIS OF A TYPICAL "GOOD" DINNER

COURSE	Food	Oz.	Proteid	Hydro-carbons	Carbo-hydrates
			Grains	Grains	Grains
Hois d'Œuvre .	Oysters . . .	2	56
	Brown Bread . .	$\frac{1}{2}$	10	1	56
	Butter . . .	$\frac{1}{16}$...	24	...
Fish . . .	Sole . . .	4	208	3	...
Entrée . . .	Mutton Cutlets .	2	144	171	...
	Mashed Potatoes .	2	18	2	184
Joint . . .	Roast Beef . . .	2	172	32	...
	Potatoes . . .	2	18	2	184
	Cauliflower . . .	2	8	3	41
Poultry . . .	Chicken . . .	2	190	58	...
	Bread (sauce) . .	$\frac{1}{2}$	10	1	56
Game . . .	Partridge . . .	1	190	30	...
	Bread Crumbs . .	$\frac{1}{2}$	10	1	56
Sweet . . .	Cabinet Pudding .	1	25	80	80
Savoury . . .	Sardine . . .	$\frac{1}{2}$	52	50	...
	Toast . . .	$\frac{1}{4}$	10	1	56
	Butter . . .	$\frac{1}{16}$...	24	...
	Cream . . .	2	...	394	33
During dinner	Bread . . .	1	41	4	224
Dessert . . .	Walnuts . . .	$\frac{1}{2}$	20	63	14
Coffee . . .	Milk . . .	$\frac{1}{2}$	6	8	11
	Total Grains	...	1188	952	995
	Total Ounces	...	2 72	2'18	2'27
Proportion of whole day's supply	60%	72%
			...	72%	16%

Comment is almost superfluous ; it will be noticed that such a meal furnishes 60 per cent. of the proteid required for the whole day, but only 16 per cent. of the carbohydrates required ; in other words, it is as a meal exceedingly *ill-balanced*. In extenuation it may be said perhaps that a "good" dinner is hardly a fair example to take of an average Englishman's daily ration. Fortunately for the Englishman there is some truth in this ; but it is only a matter of degree ; the above is an extreme case which has been purposely taken to illustrate an important fault in most of the meals eaten by English people to-day. That fault of course is a great excess of proteid, combined often with an insufficiency of carbohydrates, arising from the excessive use of animal foods, which has become more and more marked during the last century, as will be shown in the next chapter.

Needless to say all excess is harmful, but excess of proteid is especially so, because, as Prof. Chittenden says, although "proteid food . . . may by its oxidation yield energy for heat and work," yet "its combustion, owing to the content of nitrogen, is never complete. Further, its use as fuel is uneconomical and undesirable" ; for "the combustion of proteid within the organism yields a solid ash which must be raked down by the liver and thrown out by the kidneys" (Curtis). In other words, much extra work is thrown on to the excretory organs in getting rid of the waste products arising from the combustion of the excessive quantities of proteid consumed. Injurious to health at any time, this is especially so in modern times, owing to the difficulty of getting healthy and regular exercise, exercise of course being one of

the principal means, if not the principal one, of keeping the kidneys, liver, etc., up to their work.

This is the first important mistake, made by the great bulk of English people in their personal nutrition, which it is necessary to point out ; several others will appear later in due course. It should scarcely be necessary to emphasise the fact that a correctly *balanced* diet—*i.e.* one in which the various constituents of food are found in approximately the correct proportions—is one of the first essentials of a healthy dietary, and that it is folly to expect a badly constructed, ill-balanced diet, such as that of a large section of English people to-day, to produce well-nourished and healthy individuals.

CHAPTER V

EXPERIENCE OF NATIONS AND INDIVIDUALS

following are quotations, collected from
I numerous sources, which afford practical demonstration of the truth of the conclusion arrived at in the last chapter—viz. that a diet composed of vegetable products, with or without the addition of milk and its preparations, is able and sufficient to keep races of men in a high state of physical health and intellectual vigour. In order to economise space most of the quotations have been abridged.

AFRICAN COAST

“You cannot wish to see stouter or better made men than these fellows (Hadendoa camel drivers), whose glossy skins and well-filled forms show that their diet of *dura* or *sorgham* and milk agrees well with them. These two elements compose the food of the whole countryside. The *dura* is ground by rubbing-stones.”—Prof. ROBERTSON SMITH.

ALGIERS

“It was a good beginning to have a stately, bare-footed Arab to shoulder our baggage from the port, and wonderful to see the load he carried unassisted. It is well to see how nobly our Arab bears his load, how beautifully balanced is his lithe figure, and with what grace and ease he walks along. It is interesting

to note that this gentleman lives almost entirely on fruit, rice and Indian corn."—"Artists and Arabs," by HENRY BLACKBURN (1868).

ARABIA

"Few people surpass the Arabs for longevity, agility, and power of endurance. Yet they subsist on dates and milk, and for months the Bedouin Arabs consume nothing else."—Lieut. LOW in *The Food Journal* (1873.)

BOLIVIA

"The troopers of this country are fed on maize corn, cocoa and water. They will perform marches of 18, 20 and 25 leagues a day, encumbered with their baggage and without distress."—*Panama Star and Herald*.

BRAZIL, RIO JANEIRO, LAGUAYRA

"The Brazil slaves are a very strong and robust class of men. Their food consists of rice, fruits, and bread of coarse flour and the farrenia root. They endure great hardships, and carry enormous burdens on their heads a distance of a mile without resting, each man bearing upon his head a bag of coffee weighing 180 pounds, apparently as if it were a light burden. They are seldom known to have a fever or any other sickness. The Congo slaves of Rio Janeiro subsist on vegetable food, and are among the finest-looking men in the world. They are six feet high, every way well proportioned, and remarkably athletic. The labourers of Laguayra eat no flesh, and are an uncommonly healthy and hardy race. A single man will take a barrel of beef or pork on his shoulders from the landing to the

custom-house, which is situated on the top of a hill the ascent of which is too steep for carriages.”—GRAHAM’S Lectures.

“Similar facts are related of the Peruvians, Tobaso Indians, Kroomen, natives of the New Hebrides, Sandwich Islands, coast clans of the Wamrima, Japanese, etc., etc.”—(See the works of Sir JOHN SINCLAIR, GRAHAM, POPE, COOK, BURTON and BUCKINGHAM).

CANARY ISLANDS

“Mr Jewett says that one of his schooners came into Portland laden with barilla from the Canary Islands; and that he stood by and saw four stout American labourers attempt, in vain, to lift one of the masses of barilla which the captain and mate both solemnly affirmed were brought from the store-house to the vessel by a single man—a native labourer where they freighted; and he subsisted entirely on coarse vegetable food and fruit.”—SMITH’S “Fruits and Farinacea.”

CENTRAL AFRICA

“The natives of Central Africa, who subsist wholly on vegetable food, possess astonishing bodily powers. ‘The people of Jenna,’ says Landers, ‘prefer vegetable food to animal, their diet consisting chiefly of preparations of the yam and of Indian corn; a stronger or more athletic race is nowhere to be met with.’ It not infrequently requires the united strength of three men to lift a calabash of goods from the ground to the shoulders of one; and then does the amazing strength of the African appear. Some of the women that we saw bore burdens on their heads that would tire a mule.”—SMITH’S “Fruits and Farinacea.”

CHILI

"The copper-miners of Central Chili carry loads of ore of 200 lbs. weight up 80 perpendicular yards twelve times a day. Their diet is entirely vegetable ; breakfast consists of sixteen figs and two small loaves of bread ; dinner, boiled beans ; supper, roasted wheat grain. They scarcely ever taste meat ; yet on this simple diet they perform a labour that would almost kill many men."—Sir FRANCIS HEAD.

CHINA

"The Chinese feed almost entirely on rice, confections, and fruits ; those who are enabled to live well, and spend a temperate life, are possessed of great strength and agility. 'A finer shaped and more powerful race of men exists nowhere,' says Sir John Davis, 'than the coolies or porters of Canton ; and the weight they carry with ease, on a bamboo between two of them, would break down most others.'"—SMITH'S "Fruits and Farinacea."

CYPRUS

"It was extraordinary to see the result of a life-long diet of beans and barley bread in the persons of the monks of Trooditissa, who very seldom indulge in flesh. The actual head of the monastery is a handsome man of seventy, perfectly erect in figure, as though fresh from military drill, and as strong as most men at fifty."—Sir SAMUEL BAKER'S "Cyprus," in 1879.

"The people of Cyprus fast for more than a third of the year rigorously, only eating bread and vegetables, no milk or oil even. Meat and fish are looked upon as rare luxuries. The people look healthy and well, and seem to find enough subsistence in the fruit

and herbs that this island produces so plentifully.”—*The Standard*.

“These dwellers in the plain are brave, sober, faithful, (and) have the virtues of a camp. Free of the sword and saddle from their cradles, they are easily turned into good cavalry. No English officer, I am told by experts, would desire a better company before him when he moved into line.”—HEPWORTH DIXON on “The Island of Cyprus.”

EGYPT

“It is indeed surprising to observe how simple and poor is the diet of the Egyptian peasantry, and yet how robust and healthy most of them are, and how severe is the labour they undergo. The boatmen of the Nile are mostly strong, muscular men, rowing, poling, and towing continually.”—LANE’S “Egypt.”

“Their food chiefly consists of coarse bread made of wheat, millet, or maize, together with cucumbers, melons, gourds, onions, leeks, beans, chickpease, lupins, lentils, dates, etc.”—SMITH’S “Fruits and Farinacea.”

“The Egyptian cultivators of the soil, who live on coarse wheaten bread, Indian bread, lentils, and other productions of the vegetable kingdom, are amongst the finest people I have ever seen.”—LATHERWOOD.

ENGLAND

“Mr Brindley, canal engineer, informs us that where workmen, being paid by the piece, exerted themselves to earn as much as possible—men from the north of Lancashire and Yorkshire, who adhered

to their customary diet of oatcake and hasty pudding, with water for their drink, sustained more labour and made larger wages than those who lived on bacon, cheese, and beer, the general diet of labourers in the south."—SMITH'S "Fruits and Farinacea."

"Formerly, indeed, the diet of the country labouring classes was almost wholly innocent of fleshmeats and strong drinks, and it must be borne in mind that it is to this sober and temperate ancestry that the working powers of the present generation are owing. The use of flesh as daily food dates from hardly more than a quarter of a century among the peasantry of the most rural districts, and already they are beginning to degenerate. The children will have neither the health nor the constitution of their fathers, nor their immunity from suffering."—KINGSFORD.

Speaking of the Cumberland peasantry, SMILES, in his "Life of George Moore," says that although they occasionally got a slice of meat in winter, "stalwart men and comely maidens were brought up on porridge, oatcakes, and milk: in fact, there could be no better food."

BRITONS (ANCIENT)

"They were remarkable for their fine athletic form, for the great strength of their body, and for being swift of foot. They excelled in running, wrestling, climbing, and all kinds of bodily exercise; they were patient of pain, toil, and suffering of various kinds; were accustomed to fatigue, to bear hunger, cold, and all manner of hardships."—HENRY.

PLUTARCH says that "they only began to grow old at 120 years."

GOLDSMITH says that "their food consisted almost exclusively of acorns, berries and water."

FRANCE

"In a French peasant's house, in the morning, the men eat soup. It is cheap enough to make. For twelve people two handfuls of dried beans or peas, a few potatoes, a few ounces of fried bacon to give it a taste, a good deal of hot water. The twelve basins are then filled with thin slices of brown bread, and the soup is poured on it. Boiled rice, with a little milk, is sometimes taken instead of soup. If the soup is insufficient, the peasant finishes his meal with a piece of dry bread."—HAMERTON'S "Round my House," 1875.

"It is stated in a work published by Bertillon in 1874 that the vine-gatherers of the department of Nièvre, of Burgundy, etc., only eat meat once a year; the agricultural labourers of the Maine department eat it twice a year, the weavers of Sarthe on *fête* days only, and the Auvergnese about six times a year. The Breton labourers never eat it, and even rich people in this province take it only on *fête* days."—KINGSFORD.

"A native of Maine informs me that in his grandfather's time the peasants of that department enjoyed far longer life and more robust health than the present generation, who have exchanged the simple sustenance of former years for a dietary consisting largely of stimulating drinks and animal food."—KINGSFORD.

GREECE (ANCIENT)

"The Ancient Greeks lived almost entirely upon the fruits of the earth."—PORPHYRY, Platonic Philosopher of the third century.

"In the gymnasia, academies of the athletic profession, the masters subjected their neophytes to those methods which they judged the most efficacious for the production and augmentation of physical strength and power of resistance to fatigue. And one of the means employed for accomplishing this object was the enforcement of a very severe and frugal dietary, composed only of figs, nuts, cheese, and maize bread, without wine (ROLLIN'S 'Ancient History')."—KINGSFORD.

"In later times—after animal food had begun to be common among the people—a portion of flesh was introduced into the diet of the *athletæ*. But, according to the testimony of early Greek writers, it was soon found that the free use of this kind of aliment made them the most sluggish and stupid of men."—ROLLIN'S "Ancient History."

"Later, when these same *athletæ* were fed upon flesh, they were universally observed to be dull and stupid, a result which Diogenes is said to have attributed to their being 'wholly formed of the flesh of swine and oxen.'"—C. W. FORWARD.

GREECE (MODERN)

"The Greek boatmen are exceedingly abstemious. Their food consists of a small quantity of black bread, made of unbolted rye or wheatmeal, generally rye; and a bunch of grapes or raisins, or some figs. They are astonishingly athletic and powerful; and the most nimble, active, graceful, cheerful, and even merry people in the world. The labourers in the shipyards live in the same simple manner; and are equally vigorous, active, and cheerful. It is my serious opinion that one hearty man in New England

ordinarily consumes as much food in a day as a family of six Greeks."—Judge WOODRUFF, of Connecticut.

INDIA

"In 1818 the Pattamar Hindus occupied in carrying letters by land performed almost incredible journeys in the time allotted. 'These men,' says Sir John Sinclair, 'are generally tall, being 5 feet 10 inches to 6 feet high. They subsist on a little boiled rice.'"—KINGSFORD.

IRELAND

"The chairmen, porters, and coal-heavers, the strongest men in the British dominions, are said to be, the greatest part of them, from the lowest rank of people in Ireland, which are generally fed with the potato."—SMITH'S "Wealth of Nations."

"The finest specimens of the human body I ever beheld, I saw in Ireland; and they had never tasted animal food."—The Rev. HOWARD MALCOLM, of Boston.

"Many English farmers, who have been employing the natives of the Emerald Isle, bear testimony to the fact, that those who are steady, and refrain from spirituous liquors, are indefatigable; and are capable of performing a much greater amount of agricultural labour, on their simple meal of potatoes and buttermilk, than the English labourer, though feeding on abundance of fleshmeat."—SMITH'S "Fruits and Farinacea."

ITALY

"The peasants here are a splendid, hardy set, living almost entirely on cakes and porridge of

chestnut flour, a little wheat bread, and, at this season, on bread made of the *gran turco* (Indian corn).”—Private Letter from Lucca.

JAPAN

“The Japanese not only abstain from animal food,¹ but even from milk and its productions. Their chief food consists of rice, pulse, fruits, roots and herbs, but mostly rice.”—Modern Universal History.

“Hot rice cakes are the standard food of the Japanese. The Japanese are represented as robust, well made, and active, remarkably healthy, long-lived and intelligent.”—SMITH.

“The Japanese infantry soldier can carry more and march longer than the foot soldier of any other country. His miraculous power of covering long distances at a running pace”—carrying a service kit and equipment weighing 60 lbs.—“was testified to by every war correspondent in Manchuria.”—A Military Expert quoted by Colonel MURRAY in “Imperial Outposts.”

“The simplicity of a Japanese soldier’s diet—and by soldier I mean all ranks, from general to private—is proverbial. Rice is their great stand-by.”—War Correspondent of *The Daily Chronicle*.

MALTA

“The people manage to be strong and hardy on their scanty fare of black bread and coarse macaroni, eked out by such garden stuff as they cannot profitably dispose of in the market, and only washed down on Sundays and saints’ days by a draught of the

¹ This was written some years ago.

common Sicilian wine, for which they pay twopence a pint."—"One and All"; also "Dietetic Reformer" (1880).

MEXICO

"The principal article of food among the Indians of Mexico is Indian corn. On this food alone they are enabled to subsist and undergo far more fatigue, under the tropical sun of Mexico, than our northern labourers in the northern latitudes, with the free use of animal food. Those who abstain from the use of ardent spirit are muscular and strong; and among them are to be found models for the sculptor."—POPE.

NORWAY

"The general food of the Norwegians is rye-bread, milk, and cheese. As a particular luxury, peasants eat thin slices of salt hung-meat. All the travellers I have consulted agree in representing the people as thriving on this fare, and in no part of the world are there more instances of longevity than in Norway."—Dr CAPELL BROOKE.

"Though in many parts of Norway animal food is quite unknown, they are generally tall and good-looking. Being daily accustomed to climb mountains, they may be said to be in constant training, and they keep up with ease by the side of your carriage at full speed for ten or twelve miles."—TWINING.

PALESTINE

"The Fellahin rarely touch meat, but live on unleavened bread dipped in oil, or rice, olives, grape treacle, clarified butter, with gourds, melons, marrows, and cucumbers. To this frugal diet is due probably the whiteness of their teeth, the strength of their

constitutions, and the rapidity with which their wounds heal."—C. R. CONDER, R.E., "Tentwork in Palestine" (1878).

PERU

"‘These Peruvians,’ says a gentleman who has spent twenty years among them, ‘are a more hardy race, and will endure more fatigue and privation, than any other people in the world. They subsist wholly on vegetable food. Parched corn is their principal, and generally their exclusive, article of food, when engaged in any particular enterprise or effort which requires great activity and power of body.’"—SMITH’S "Fruits and Farinacea."

POLAND

"Our Polish Upper-Selesians are a very frugal people. A mason who goes to work in the town, distant five to eight miles or more, must rise by three o’clock. His diet for the whole day is the bread which he takes in his pocket. So with the field labourer. As a soldier he is very enduring, and the Polish regiments can always make long marches. The main articles of diet of our Polish peasantry are bread and potatoes."—E. WELLSHAENSER.

"‘The Polish and Hungarian peasants from the Carpathian mountains,’ says a Polish nobleman, ‘are among the most active and powerful men in the world; they live almost entirely on oatmeal bread and potatoes.’"—SMITH’S "Fruits and Farinacea."

RIO SALADA

"The Spaniards of Rio Salada, who are employed in transporting goods, live wholly on vegetable food. They are very robust and strong, and bear prodigious burdens on their backs, such as require three or

four men to place upon them, travelling with a speed which few men can equal without any encumbrance.”
—SMITH’S “Fruits and Farinacea.”

ROMANS

“Fleshmeat entered but very sparingly into the diet of the Roman soldier, till after the days of Roman valour had begun to pass away; and, with equal pace, as the army became less simple and less temperate in their diet, they became less brave and less successful in arms. So far as bodily strength and ability to endure voluntary action are considered, the Roman soldier was far the most powerful in Rome’s earliest days, when he subsisted on his simple vegetable food.”—GRAHAM’S Lectures.

“The chief food of the Roman gladiator was barley cakes and oil; and this diet, Hippocrates says, is eminently fitted to give muscular strength and endurance. The daily rations of the Roman soldier were one pound of barley, three ounces of oil, and a pint of thin wine.”—KINGSFORD.

RUSSIA

“The people of Russia, generally, subsist on coarse black rye-bread and garlicks. I have often hired men to labour for me. They would come on board in the morning with a piece of black bread weighing about a pound, and a bunch of garlicks as big as one’s fist. This was all their nourishment for the day of 16 or 18 hours’ labour. They were astonishingly powerful and active, and endured severe and protracted labour far beyond any of my men. Some of these Russians were 80 and even 90 years old, and yet these old men would do more work than any of the middle-aged men belonging to my ship.”—Capt. C. S. HOWLAND, of New Bedford, Mass.

"Here were about 600 irregulars, militia and regulars, all fine-looking men. There was not enough in the place in the way of meat to satisfy two companies of English soldiers, yet here were 3000 to 4000 men. With a little millet boiled into a pudding, some goats' milk, cheese and onions, and a goblet of 'vin du pays' even the chiefs are quite contented, while their retainers make good cheer over cakes of Indian corn flour, some curds, a piece of dried fish, or a strip of tough beef among half-a-dozen."—War Correspondent of *The Daily News* (1878).

SIERRA LEONE

"The natives, who live in a climate said to be the worst on earth, are very temperate; they subsist entirely on small quantities of boiled rice, with occasional supplies of fruit, and drink only water; in consequence they are strong and healthy, and live as long as men in the most propitious climates."—*Monthly Magazine* (1815).

SMYRNA

"In Smyrna they are stout, robust men of great muscular strength; and carry at one load from 400 to 800 pounds. An American merchant pointed me to one of them in his service, and assured me that he carried at one load, from his warehouse to the wharf, about 25 rods, a box of sugar weighing 400 pounds, and two sacks of coffee weighing each 200 pounds—making in all 800 pounds."—Judge WOODRUFF, of Connecticut.

SPAIN

"I have witnessed the exceedingly large loads the Moorish porters in Spain are in the habit of carrying, and have been struck with astonishment at their

muscular powers. I have seen two of these men stow off a full cargo of wine in casks. They brought their food on board with them ; it consisted of coarse brown wheat bread, with grapes."—Capt. C. F. CHASE.

"Those who have penetrated into Spain have probably witnessed to what a distance a Spanish attendant will accompany on foot a traveller's mule or carriage, doing 40 or 50 miles a day on his fare of only raw onions and bread."—SMITH'S "Fruits and Farinacea."

TURKEY

"The boatmen and water-carriers of Constantinople are decidedly, in my opinion, the finest men in Europe, as regards their physical development, and they are all water drinkers; they may take a little sherbet at times. Their diet is chiefly bread; now and then a cucumber, with cherries, figs, dates, mulberries, or other fruits which are abundant there; now and then a little fish."—Sir WILLIAM FAIRBAIRN'S "Report on Sanitary Conditions."

"As a member of a warlike race (the Turk) is without equal in Europe in health and hardiness. He can live and fight when soldiers of any other nationality would starve. His excellent physique, his simple habits, his abstinence from intoxicating liquors, and his normal vegetarian diet, enable him to support the greatest hardships, and to exist on the scantiest and simplest foods."—*Standard* (1877).

"Low stature is the exception in the Ottoman army. These men of herculean form are endowed with fabulous sobriety; they drink no intoxicating drinks, and seldom touch meat."—*Daily News* (1877).

The following are a few athletic achievements of non-flesh-eaters in this country:—

GEORGE OLLEY, Amateur Champion Cyclist, has broken over 200 records and has twice won the "Blue Ribbons" of the British Cycling World—*i.e.* the Carwardine Cup and the Dibble Shield. In 1904 he acquired the unpaced records of London to Edinburgh; 12 miles on Southern Roads: 50 miles on Southern Roads: 35 miles on Southern Roads. He also held all Amateur Path Records from 6 to 12 hours and the 3, 4 and 5 Miles Grass Records. In 1905 he lowered the unpaced record from John o' Groats to Land's End by 11 hours 10 minutes.

W. DE CREUX HUTCHISON holds the Dover to London and Back Cycle Record. Also the Dover to London Walking Record.

H. E. BRYNING won the Cycling Championship of India in 1897, 1898 and 1900.

F. NEWELL and H. H. AGNEW cycled unpaced 198½ and 193 miles respectively in 12 hours on Western Roads.

MISS ROSA SYMONS in 1904 cycled *via* London, from Land's End to John o' Groats and back in 15 days 21 hours 32 minutes, being a World's Record for Women.

KARL MANN in 1902 won the Dresden to Berlin International Walking Race (125 miles) in Amateur Record time of 26 hours 58 minutes. He arrived 7 hours before the first meat-eater. 18 vegetarians and 14 meat-eaters started, 10 vegetarians and 3 meat-eaters finishing; the first 6 arrivals were vegetarians.

In *The Daily News* of 29th June 1898 the Berlin correspondent stated that 14 meat-eaters and 8 vegetarians started for a 70 miles' walking match. All the vegetarians reached the goal "in splendid condition," the first covering the distance in 14½ hours. An hour later than the last vegetarian came the first meat-eater, and he was "completely exhausted." All the other meat-eaters dropped off after 35 miles.

GEORGE H. ALLEN in 1904 broke the Land's End to John o' Groats Walking Record by 7 days. He averaged 45, 53 and 66½ miles respectively during the first, second and third weeks, covering 88½ miles on each of the last two days. He lost no weight on the walk.

L. J. SIMONS in 1904 walked 25 miles on the London-Bath Road in 3 hours 57 minutes 43 seconds.

JNO. BARCLAY in 1896 won the Half-Mile Running Championship of Scotland.

EUSTACE MILES in 1902 placed to his credit all four amateur events in tennis and racquets—viz. Tennis Championship (4th time); Tennis Gold Medal Competition (5th time); Racquet Championship (Singles); and Racquet Championship (Doubles). In 1905 he again won the Tennis Championship of the World.

EMIL R. VOIGHT in 1908 won the 5 Miles Flat Race in the Olympic Games at the Stadium. *The Daily Chronicle* says, "It was a joy to see this little Manchester man, whom the vegetarians may claim as a perfect athlete, able to win the World's Championship on a vegetable diet . . . one of the most brilliant achievements ever done by an English runner."

Voight also won the 4 Miles Amateur Championship, and the 4 Miles Handicap at Glasgow (from scratch).

F. A. KNOTT won the 1500 Metres Cycle Race at the Stadium, breaking the previous Record, and in the same day he won the 3 Miles Scratch Race.

It is of further interest to note that amongst eminent men and women who have been vegetarians the following names are given by various authorities :—

Pythagoras	The Christian Fathers
Plato	Tertullian
Aristotle	Origen
Socrates	Chrysostom
Diogenes	Clement
Empedocles	Francis d'Assisi
Porphyry	and others
Plutarch	Milton
Ovid	Isaac Newton
Seneca	Franklin
Buddha	Goldsmith
Manu	Locke
Zoroaster	William Lambe
Daniel	Pope
Isaiah	Voltaire
Hypatia	Gleizes
Iamblicus	Rousseau
Asoka	Schopenhauer
Apollonius of Tyana	Maeterlinck
The Christian Apostles	Paley
James	Wesley
James the Less	Hartley
Matthew	Lamartine
Peter	Gassendi

FOOD AND HEALTH

Ray	Bernard Shaw
Linnæus	Eustace Miles
John Howard	Mrs Despard
Garibaldi	Robert Blatchford
Swedenborg	Horace Greeley
Shelley	Lord Charles Beresford
Newman	General Sir Edward
Byron	Bulwer
Michelet	Dr Stenson Hooker
Edison	Dr Haig
Marconi	Prof. E. B. Mayor
Tesla	Lady Paget
Wagner	Lady Somerset
Aurungzebe	Ouida
General William Booth	Mrs Mona Caird
W. Bramwell Booth	Hon. C. S. Rolls
Sir Isaac Pitman	Rev. Hon. E. Lyttelton
Herbert Burrows	(Headmaster of Eton
Tolstoi	College).
Rev. R. J. Campbell	etc. etc.
Mrs Annie Besant	

It is regretted that such a large amount of space has had to be devoted to the above quotations, but it has been thought best to put forward abundance of evidence, in order that the fact might be established beyond dispute, that vegetarian diet is able to maintain races of men in as high a state as is known of physical and intellectual development, in view of the ignorance still so prevalent among the people of this country on a matter of such importance.

The numerous arguments that one commonly hears put forward, as objections to vegetarianism, will be dealt with in due course in a later chapter.

CHAPTER VI

FLESH-EATING AND DISEASE

IN the preceding chapters evidence has been adduced to show that vegetable products are well adapted, both theoretically and practically, to keep men in robust health and strength. In this chapter it is proposed to consider some of the disadvantages attendant on a diet composed of flesh-foods. The following are quotations bearing upon the matter ; as before, the extracts have been mostly abridged.

CANCER

“ The first step urgently required to be taken with a view of arresting the increase of cancer now going on, is to stop the sale of diseased meat and other foods of an injurious and pernicious nature. I am informed that it is a very common practice with farmers, the moment they discover disease in sheep or cattle, to at once kill and prepare them for market ; animals suffering from anthrax, foot-and-mouth disease, tuberculosis, etc., are dressed up so that experienced butchers and experts are deceived.”—Dr ALEX. MARSDEN, M.D., F.R.C.S. (Chairman of the Cancer Hospital, London), Letter to *The Standard*, 5th March 1901.

TUBERCULOSIS

It is a proved fact that a large proportion of the cattle which are slaughtered for food purposes suffer

from tuberculosis. That it is possible for this disease to be transmitted to those who eat the flesh of tuberculous cattle is shown by the Report of the Royal Commission on Tuberculosis, which reads as follows:—

“Numerous experiments have been performed upon the possibility of the tubercular virus entering the body through the alimentary canal. In these experiments the apparently healthy flesh of tuberculous cattle (not the manifestly diseased organs) has been swallowed by various animals, with the effect that the disease has in many cases fatally followed the injection of such infected material.”

The Society of Medical Officers of Health at Manchester in 1892 resolved that “the flesh of any animal affected with tuberculosis, *to however slight an extent*, is unfit to be sold as human food.”

Cooking the flesh of tuberculous animals does not necessarily destroy the germs, because although the bacilli are destroyed at the temperature of boiling water, the interior of a large joint of meat never reaches boiling point at all.

“Tuberculosis exists among cattle and other animals to an extent which was scarcely realised some 15 years ago. Evidences from the public slaughter-houses in the large towns of England speak with no uncertain sound on the matter. I may remind you of the examination of the Queen’s herd of cattle, where out of 40 animals 36 (or 90 per cent.) were found to have been affected. It is probable that Tuberculosis is scarcely likely to be less prevalent in herds less constantly under supervision.” —Dr JACKSON, President of the British Medical Association (1889).

Dr W. COLLINGRIDGE quoted before the Sanitary Committee of the Public Health Department (London) the statistics of Mr J. King, who found

that of 500 carcasses of cows examined by him 244, or nearly 50 per cent., showed signs of tuberculous lesions.

Dr NIVEN, M.O.H., Manchester, recently selected 83 samples of milk on sale in that city and found that 18 contained the "bacillus tuberculosis," thus proving that a large percentage of the cows had tuberculous udders. Still larger must have been the percentage of cows who suffered from tuberculosis in some form or other, because the lungs are more often affected than the udders.

SAUSAGES

Dr F. W. ALEXANDER, M.O. for Poplar, gave the following information to *The Star* newspaper:—

"There is a gigantic illicit trade in horseflesh for human food in London. Carcasses of horses are sold by the knackers, ostensibly for cats' meat, but they are put into tanks, (and) then the flesh is taken in the early morning to the butcher's mincing machine and turned into brawn and sausages. If we come upon it in its unprepared state we are told that it is intended for cats' meat; when it has been minced up and spiced, detection can be defied. It is to be remembered that horses are not bred for human food, and when they have been killed it is more than likely to be on account of *disease*. The flesh of horses that have died from glanders and farcy can be treated in the way I have described, and served up to the public as food, and *I am convinced they are.*"

Dr BELL writes: "As Mr Batty Langley, M.P., declared in a recent speech that 79,000 horses were shipped in one year to Germany, 'shabby, skinny, and some with sores all over them,' there can be no doubt that a very large traffic of this sort is taking place."

MEAT INSPECTION AND DISEASED MEAT

"I have discovered the disgraceful fact that in England, with the exception of the biggest cities, there is practically no meat inspection at all. There are qualified meat inspectors in London and in about twelve other boroughs in the kingdom. Elsewhere your butcher is at liberty to sell you the meat of tuberculous animals, the meat of animals which have had anthrax, or septic peritonitis, or actinomycosis, or fever, or any other loathsome disease."—ROBERT H. SHERARD, *London Magazine*, August 1905.

"There is no question about it that owing to the evils likely to arise from imperfect supervision of private slaughter-houses, the present widespread ingestion of flesh is responsible to an appreciable extent for many diseases which now exist, and which vegetable-eaters avoid. We have diarrhœa, cramp, trichina-disease, tuberculosis, carbuncle, malignant pustule, and the various forms of tapeworms through eating diseased meat."—J. EDWIN COONEY, M.D., M.O.H.

On 6th December 1904 Dr Collingridge, M.O.H. for the City of London, told the presiding alderman at the Guildman Police Court that four quarters of beef, seized by the Sanitary Inspector in the London market, were affected with cancer and sarcoma. He further stated that beef containing sarcoma was the most dangerous form of food imaginable. Such incidents are said to be frequent.

"Beef cattle reach the hands of the butchers fevered for want of water and nourishment, or covered with festering wounds or bruises. If the number of beeves which reach the markets of the country utterly unfit for human food could be ascertained and pub-

lished, it would be appalling."—"Report of Animal Industry of the United States" (1887-1888).

Dr F. MURPHY, the L.C.C. Medical Officer, states in a report that London receives daily large quantities of meat which is "too far gone" to be sold locally, and "there is no doubt that there is a definite trade carried on in meat of a quality which would never knowingly be allowed to be used in any civilised community."

In an address in 1895 Sidney Beard said: "You will be able to realise the danger which is constantly incurred, when I tell you that the inspectors of the Central Meat Market, London, do not see the slaughtering or the internal organs at all, but only examine the meat with the naked eye, a long time after it has been killed and dressed. This is in England's model meat market. An inspector asserted upon oath that he believed 80 per cent. of the meat was tuberculous, and that to exclude such would leave the public without a supply."

In Berlin abattoirs in one year tuberculosis was detected in 4300 cattle and in 6393 pigs.

Eugene Christian writes that "recent experiments in the states of Ohio and Illinois developed the fact that about 36 per cent. of the best cattle in these two states are diseased. The majority of them had tuberculosis."

*

During the first three months of 1902 the Board of Health in New York City confiscated over 325,000 lbs. of meat which was totally unfit for use.

In one year 1173 tons of putrid meat was destroyed at Smithfield, and elsewhere in London between 30,000 and 40,000 tins of bad foreign meat. More

serious is the danger lurking in tins of salmon, lobster, sardines, condensed milk, soups, rabbit, compressed beef, etc., which are sold to the poor and lower middle classes. Two thousand such "blown" tins were seized by the inspector at Islington.

Mr H. HARRIS, Secretary of the Jewish Ecclesiastical Board, referring to animals slaughtered at Deptford and Whitechapel alone in twenty-five weeks, reported that out of nearly 20,000 sheep 28 per cent. were diseased, out of nearly 2000 calves 32 per cent. were diseased, and out of over 13,000 oxen 47 per cent. were diseased.

Prof. GAMGEE, M.O. to the Privy Council, in his fifth report, stated that "a fifth of the total amount of the meat consumed is derived from animals killed in a state of disease malignant or chronic," and as Jewish experts reject one-third of the carcasses they examine—without the aid of a microscope—Prof. Gamgee's estimate is probably well under the mark.

The above are to be regarded merely as specimen quotations, which could be multiplied almost indefinitely. The theory, which is now being entertained by a continually increasing section, not only of the medical profession but also of the lay public, that the flesh of even *healthy* animals is often directly responsible for many diseases, will be more conveniently dealt with in the next chapter. With regard, however, to the part played by the flesh of *diseased* animals in the causation of disease in men, there can scarcely be two opinions; for we have it on the best authority, both that a large proportion of the meat consumed in this country is diseased, and that such diseased flesh can and does give rise to disease in

those who consume it. It is of course impossible to say how much sickness and suffering is directly due to this cause, but that it must be a very large amount is clear from such figures as are available of expert examination of meat. It will scarcely be necessary to remind the reader that, large as is the amount of diseased meat seized by inspectors, by far the greater part of the meat consumed finds its way into the homes of English people without ever undergoing inspection at all.

It may, however, be urged that an efficient system of inspection would prevent the sale of diseased meat. But against this it must be remembered that such inspection, to be of full value, must be microscopical, which would involve an immense amount of labour and expense; and further, experts tell us that, so thoroughly are cattle impregnated by disease, that to reject all tainted flesh, if it did not cut off the supply altogether, would at least enormously increase the price of flesh-foods.

Neither is there much help in the suggestion that disease should be eliminated from cattle; for this at the best would be a lengthy, laborious and costly process, even if we knew how to set about it, which of course we do not know. Our whole system of rearing animals for food, "improving the breed" as it is called, has the effect of producing a race of unhealthy animals; for what is done is to select the fattest and most indolent, and breed from them, until eventually we produce creatures which are simply masses of flesh and adipose tissue, often so unwieldy that they can barely support their own weight or move about at all. "What is the sty-fed pig?" says

Prof. MAYOR ; “a tub of wheezing lard, tottering on four crazy pegs, utterly unable to run”—quite a different creature from his brother, the wild pig of the jungle. The bloated and unnatural state of our prize cattle, even if it be not itself a state of disease, as it often is, is one which strongly predisposes to disease.

Consoling as some people may find the reflection that if, some day, an efficient system of meat inspection is installed, or if, some day, disease is reduced or eliminated from animals raised for food, the chances of their incurring sickness from the use of diseased flesh will be reduced to a minimum, others may find a simpler solution of the difficulty in discarding the use of such dangerous materials altogether, and returning to the diet dictated by nature, approved by science, and recommended by the experience of man.

CHAPTER VII

DR HAIG'S "URIC ACID" THEORY

"There is perhaps no more deep-seated delusion in the popular mind than the supposition that disease comes in some spontaneous manner, like the outburst of a volcano. There are more than 1500 distinct diseases described in our medical books, and with them go thousands of symptoms, but they all spring from a violation of a few of nature's laws. That this is no theory but an absolute fact has been demonstrated to a mathematical certainty by the extensive researches of such men as Bouchard and Boix in France, and Dr Haig in London, as well as the painstaking efforts of thousands of scientific men in all parts of the world."—Editor of the *American Medical and Surgical Bulletin*.

DURING the last few years the part which uric acid, and other substances of a kindred nature, play in the causation of disease, has received a great deal of attention and study at the hands of both the general public and the medical profession. In this chapter an attempt will be made to give an epitome of the principal points in the theories of Dr Haig, whose name in this connection is so well known.

Urea and uric acid represent the waste or effete products resulting from the destruction of the proteid or albumen of the tissues of an animal organism, such wear and tear of the tissues, as it may be called, being due to the activities, both internal and external, of the organism. It has been ascertained that the two substances are formed in the proportion of about one of uric acid to thirty-five of urea, and that, after

passing through the blood, they are thrown out of the system through the agency of the liver and the kidneys. An ordinary person excretes on an average about ten grains of uric acid per day. To continue the steam-engine analogy, these ten grains may be said to correspond to the smoke, ashes and grit in the bearings of an engine and its boiler.

Uric acid, or some similar substance, has been found to exist in certain foods, principally flesh foods, which of course contain the substance resulting from the wear and tear of the animal's tissues during life. Other substances whose action on the human organism appears to be very similar to that of uric acid are the thein of tea, the caffein of coffee, and a few others. Haig in his works uses the term uric acid to designate the whole group; other names in use are xanthins, purins, waste products, effete matter, effete salts, food poisons, etc. In this chapter the term xanthin is intended to include the whole group. The following table shows the amount of xanthins in various substances :—

TABLE OF XANTHINS IN FOODS

FISH—	Grains per lb.	FLESH—	Grains per lb.
Cod	4·1	Beef, ribs	8·0
Plaice	5·6	Veal, loin	8·1
Halibut	7·1	Pork, loin, and Ham, av.	8·3
Salmon	8·2	Turkey	8·8
FLESH—		Chicken	9·1
Pork, neck	4·0	Beef, sirloin	9·1
Tripe	4·0	Beefsteak	14·5
Rabbit	6·3	Liver	19·3
Mutton	6·8	Meat Juice	50·0
Beef-Tea	7·0	Meat Extract	63·0

TABLE OF XANTHINS IN FOODS—*continued.*

VEGETABLE FOODS—	Grains per lb.	TEA, ETC.—	Grains per lb.
Potatoes . . .	0·1	Cocoa . . .	59·0
Onions . . .	0·06	Coffee . . .	70·0
Asparagus . . .	1·5	Ceylon Tea . . .	175·0
Peameal . . .	2·5		
Oatmeal . . .	3·5	MISCELLANEOUS—	
Haricot Beans . . .	4·2	Eggs, Milk, Butter, Cheese,	
Lentils . . .	4·2	White Bread, Rice, Tapioca,	
ALCOHOLIC DRINKS—		Cabbage, Lettuce, Cauli-	
Lager Beer . . .	1·1	flower, etc., etc.—No trace	
Pale Ale . . .	1·3		
Porter . . .	1·4		

NOTE.—It is sometimes incorrectly stated that pulses are worse from the xanthin point of view than flesh-foods, but if portions of, say, haricot beans, codfish, and beefsteak are taken *affording the same amount of solid nutriment*, the cod will contain more than 6, and the beef nearly 11, times as much xanthin as the beans.

From the above figures it is clear that, in addition to the xanthins normally being formed in the system, a person may, if a meat-eater, introduce into his system in the course of a single day sufficient flesh xanthins to double or even treble the amount normally produced. If anything then occurs—and it will presently be shown that several such things may occur—to hinder or prevent excretion of xanthins, the latter will accordingly accumulate in the system; and in the course of months and years these accumulations may easily, and actually do in many instances, amount to hundreds of grains. Recollecting that xanthins are *waste or effete matter*, it is again easy to understand that the retention of such matter in tissues, organs or blood may give rise to a whole host of irregularities, resulting in

sickness and disease. This, in one word, is what Haig and many others have found—viz. that quite a multitude of diseases are found to be associated with excess of xanthin in the system, and, conversely, that if such excess be removed and not allowed to recur, the diseases will diminish or disappear. This is in accord with the saying of a famous physician, that there is really only one disease in the world—*impure blood*. This point is emphasised because one so frequently hears it said that Haig and his followers are too wild and extravagant in their tirade against xanthins. Bearing in mind, however, that certain foods contain considerable quantities of these substances, and that the latter are known to be impurities, in other words *poisons* to the human system, it is quite conceivable, nay, probable, that blood charged with such poisons may produce or excite, under certain conditions, almost any disease known to man; the way in which the disease will show itself, in any particular case, being determined by the well-known tendency of an organism to succumb to hostile conditions at its weakest spot. On this principle identically the same cause—viz. poisoned bloodstream—may produce in a number of individuals an equal number of different diseases.

An excess or accumulation of xanthins in the system may occur in one of two principal ways: either in solution in the blood, or as a deposit in tissue, organ or joint. The former gives rise to what Haig calls the "Circulation or Solvent" group, of which instances are headache, hysteria, mental depression, lethargy, insomnia, asthma, dyspepsia of certain kinds, congestion of the liver, diabetes,

cramp, gravel, anæmia, and many others. The latter gives rise to the "Local or Precipitation" group, such as gout, rheumatism, local inflammations of many kinds—*e.g.* of nose, pharynx, lungs, stomach (gastritis), liver (abscess, jaundice, etc.), skin (eczema), intestines (flatulence, colic, etc.), muscles (myalgia), nerves (neuralgia), etc., etc., and in connection with microbes, catarrh, influenza, phthisis, pneumonia, malaria, etc., etc.

If blood containing uric acid be chilled, or be slightly acidulated, the uric acid separates out as a bulky, gelatinous precipitate known as colloid, or "glue-like." It is easy to see that such a precipitate in the blood would materially impede the circulation, particularly in the capillaries, or minute channels, which distribute the fresh blood to every part of the body. This is Haig's explanation of the method in which xanthins impede the circulation. He says, "I found that every fluctuation [of uric acid in the blood] was accompanied by a quite obvious and distinct fluctuation of the capillary circulation. I therefore saw that uric acid controls the capillary circulation of the whole body, and that this capillary circulation is slower the more uric acid there is in the blood, and quicker the less there is in the blood. . . . We can now say, with absolute certainty, that uric acid controls and conditions the capillary circulation of the whole body (and this control can be demonstrated in less than a minute, and by anyone without instruments)." The last remark refers to the "capillary reflux"; if the point of the finger be pressed on the back of the hand (the latter being about the same temperature as the rest of the body

and at about the level of the heart) and then removed, the time taken for the white spot to disappear is a measure of the freedom of the capillary circulation. Haig speaks very highly of this test, which he uses constantly; and he even challenges anyone to produce a xanthin-eating person—*e.g.* a flesh-eater—whose capillary circulation is as free as that of a person living on a xanthin-free diet—*e.g.* a well-selected vegetarian dietary.

If the above is true, it follows that xanthins, by impeding the blood in carrying out its functions of heating, feeding and cleansing the body, may injuriously affect any or every part of the whole body.

The other way in which excess of xanthins may occur is as a deposit; in cases where xanthins are being taken with the food and where, owing to the introduction of these xanthins, or other acids, or to cold, the solvent power of the blood is overpowered, the excretion of xanthins is checked, and the blood deposits some of the xanthins it contains in tissue, organ or joint. Once a deposit is commenced it rapidly grows, owing to a property which solid uric acid possesses of drawing to itself from a liquid any that there may be there dissolved. Thus Haig says that "a little solid uric acid thrown on a filter will almost completely clear a urine of uric acid, even if it is only poured quickly through it once or twice." This action is known as the "uric-acid" filter. In this way deposits grow and give rise, in joints or muscles, to twinges of gout or rheumatism, or in organs to inflammations of various kinds.

The following are a few more of the simpler and more obvious effects of excess of xanthins in the system. During and after exercise sensations of fatigue will appear sooner and persist longer than when the blood is free from xanthins, because, the circulation being obstructed, the tissues cannot receive the fresh nutriment they require, nor can the waste products (more uric acid) be quickly removed from the muscles and tissues. Further, the perspiration induced by exertion takes acid out of the blood, and thereby makes the latter a better solvent of uric acid, so that it immediately dissolves any accumulations or deposits that there may be lurking in the system, thus still further accentuating the feelings of fatigue. Hence, as Haig points out, the expression "hot and tired" has come to be used by flesh-eating peoples as though heat and fatigue necessarily went together. The experience of vegetarian races, as well as of a few individuals in this country who live on a well-constructed fleshless diet, is in accordance with the above—*i.e.* they find that their diet diminishes fatigue, or in other words increases their powers of endurance.

It was said above that chilling a solution of uric acid will cause a precipitate, such precipitate setting up a "filter"; for this reason those whose blood is charged with xanthins are more liable to suffer from chills, resulting perhaps in catarrh, influenza, pneumonia, rheumatism, etc., than those whose blood-streams are pure. Stiffness and soreness in limbs and joints after exercise result from a similar cause.

When there are accumulations of unexcreted xanthins, and when for any reason such as injury,

sickness, etc., the vitality of the body is lowered and the functions of digestion, metabolism, etc., are carried on with less vigour than usual, the lowered vitality will be a signal for a rush of uric acid into the blood ; this will produce still greater depression, both physical and mental, and thus aggravate the effects of the original "shock" caused by the illness or injury, and make recovery more difficult.

Another result of the circulation being obstructed by the presence of xanthins is to hinder the absorption of food from the digestive tract, thereby giving rise to putrefaction of that food in the intestines, the dangers of which are too well known to need comment. Non-absorption of food also predisposes to constipation. It is a common experience of vegetarians that their diet is less constipating than a diet of flesh.

Exercise being one of the best ways of helping the system to get rid of its xanthins, it follows that those who live on a flesh diet will be more dependent on exercise, in order to keep in good health, than vegetarians. In view of the difficulty nowadays of obtaining regular exercise, this is a point of much importance.

It has been observed, in the case of those who have accumulation of xanthins in their systems, that the blood is fullest of xanthins in the morning hours, and tends to clear itself towards the evening. A result of this, as Haig points out, is "a certain amount of dullness, heaviness and disinclination for mental or bodily exertion in the morning hours, often associated with more or less irritability and mental depression. In fact, the meat-eater is never

quite at his best till the evening, when rising acidity clears his blood of uric acid, and this is, I think, one of the factors that has caused our morning and evening hours to grow progressively later as we have drifted into living more in towns, eating more luxuriously, and taking more poisons."

One of the most important disadvantages of a flesh diet is its stimulating character; xanthins themselves act, at first, as stimulants, "as may be demonstrated," says Haig, "by swallowing a few grains of it [uric acid]"; also, the other acids which flesh-meat contains drive uric acid out of the blood, thus freeing the circulation and producing the feeling of stimulation. The effect, however, is only temporary; the xanthins will eventually come back into the blood and will produce a degree of blocked circulation and depression corresponding to the previous stimulation. The natural tendency of a person in this condition is to resort to more stimulation—*i.e.* to more flesh-meat, or to alcoholic or tea stimulation. Here is one explanation of the commonly observed fact that meat-eaters often become hungry again, or rather *feel a craving which is interpreted as hunger*, a few hours after a meal; hence meat-eaters are generally found to partake of more meals in the day than vegetarians. Amongst the teeming millions of the East, for instance, two meals a day is the most general rule, often only one, whereas in the carnivorous West "three square meals" a day may be regarded as the minimum, while four or even five meals a day are quite common. The stimulating nature of flesh-foods may thus be regarded as one of the most important causes of excessive eating, which

is undoubtedly one of the most prevalent, and the most harmful, of all the dietetic errors of the present day.

From the above considerations it appears that flesh-foods, in so far as they are stimulants and, like all stimulants, create a desire for further stimulation, are probably an important predisposing cause of alcoholic drinking. It is a commonly observed fact that vegetarians, not feeling the need of stimulation so much as flesh-eaters, seldom take alcoholic drinks. This point will be referred to in a later chapter.

It is to the stimulating property of flesh-foods that may be traced the characteristic sensation of pleasant "satisfaction" usually experienced after a meal of flesh, and missed, *by the habitual flesh-eater*, after a fleshless meal. By repeated stimulation from meal to meal, thereby repeatedly driving xanthins out of the blood into the tissues, a man with a vigorous constitution may keep in good health for many years. But the process cannot go on for ever; the day will come, when, for some reason or other, nutrition and vitality fall below par, and at once the stored-up xanthins pour into the blood, and may cause dire mischief. This affords an explanation of the collapses, which are so common, of apparently healthy and vigorous men in middle or late middle life. "The position of a man," says Dr Perks, "whose blood is surcharged with effete salts, may be likened to that of a man in a smithy with pockets stuffed with loose gunpowder—a chance spark may result in a disastrous and disabling explosion at any moment."

Herein also lies an explanation of the fact, well

known to insurance companies, that people who never seem to be in quite full health, but are generally slightly ailing, frequently live longer than those who are, apparently, much more robust and full of vitality. "Creaking doors hang long," as the saying is; it is often the case that those who are always rather below par are so because their blood is charged with the xanthins which they are continuously, day by day, getting rid of, whereas the other class enjoy "a short life and a merry one," by continually driving xanthins out of the blood into the tissues, thus having the advantage of a free blood-stream in the present, but storing up trouble for the future.

Excess of xanthins in the blood will, by causing defective combustion, also lead to deposit of adipose tissue, and this is probably one of the causes of obesity in middle and later life, which is nowadays so prevalent.

It will have been observed in the table of xanthins in foods that beef-tea, meat-extracts, etc., contain large quantities of xanthins. The following quotations are illustrative of the rapidly changing attitude of the medical profession towards the use of such preparations :

"Nothing has been more conclusively shown than that beef-tea is not a food: it is nothing more than a stimulant. The chemical composition of beef-tea closely resembles that of urine, and it is more of an excrementitious substance than a food."
—Prof. ROBERTS BARTHOLOW.

"Beef-tea and its congeners take rank as restoratives or stimulants rather than as nutrients."
—Sir WILLIAM ROBERTS.

"It is hard for ladies to realise that the beef-tea they make contains absolutely no nourishment and is nothing more than a slight stimulant. Many a patient has been starved on beef-tea, whether made from fresh beef or from meat-extracts."—Statement extensively circulated by the Bovril Company.

"Animal broths are totally destitute of food properties. A vast amount of needless ill-health is caused by the use of these preparations so destitute of food value."—Dr WINTERS, Specialist for Children's Diseases at Cornell University, U.S.A.

"The most nutritious matter of beef, the muscle substance or proteid and the fat, is rejected in making Liebig's extract, whilst the effete or waste products are retained. In bovril and some other preparations some meat fibre has been added with the object of imparting a definite food value."—A. W. DUNCAN, F.C.S., in "The Chemistry of Food."

". . . As this [added meat fibre] amounts to at most 8 or 10 per cent., it is obvious that a large quantity of the substance would be required to obtain as much unaltered proteid as is contained in an egg."—C. A. MITCHELL, in "Flesh Foods."

"The amount of these constituents [added meat fibre] present in such a quantity of meat-extract as is usually, or could be, taken at a time, is too insignificant to give any appreciable value as nutriment."—A. H. ALLEN, in "Commercial Organic Analysis."

"Instead of an ox in a tea-cup, the ox's urine in a tea-cup would be much nearer the fact; for the meat-extract consists largely of products on the way

to urea, which more nearly resemble in constitution the urine than they do the flesh of the ox."—Prof. HALLIBURTON.

It may be mentioned that some savage tribes take the urine of the cow as a stimulant.

Dr T. R. ALLISON, Ex. L.R.C.P., has thrown out the challenge that he is prepared to give £100 to any hospital or public institution if the maker of any meat-extract can prove that a pint of his stuff is equal in nourishing and sustaining properties to a pint of wheatmeal gruel made from two ounces of fine wheatmeal, milk and water.

"I think it is a question whether beef-tea may not frequently be actually injurious, and whether the products of muscular waste, which constitute the chief portion of beef-tea, beef-essence, or even the beef itself, may not, under certain circumstances, be actually injurious."—Dr LAUDER BRUNTON.

"Instead of preventing colds, influenza, and other complaints, they [meat-extracts] predispose to them by overloading the body with waste products."—A. W. DUNCAN, F.C.S., in "The Chemistry of Food."

"Hundreds of our fellow-creatures are daily dropping into their graves unfed, unsuccoured, because beef-tea is given as a food—given for what it is not. . . . All the bloodshed caused by the war-like ambition of Napoleon is as nothing compared to the myriads of persons who have sunk into their graves from a misplaced confidence in the value of beef-tea."—Dr MILNER FOTHERGILL.

It would seem that, in the use of beef-tea and other "deadly decoctions of flesh" (Haig), stimulation has been mistaken for strength. It is now, however, recognised that stimulation and strength are as wide apart as the poles; a stimulant does not, as a true food does, put strength into the body, but draws strength out of it—*i.e.* it acts, to again make use of the steam-engine analogy, like a *forced draught*, making the vital fires burn up more brightly by calling up the reserves of the system. Or again stimulation may aptly be compared to the use of a whip with a horse; it quickens the pace, but it "takes it out" of the animal; stimulation may be said to be a process which enables us to enjoy to-day by mortgaging to-morrow, every period of stimulation being inevitably followed by a corresponding period of depression; a vicious circle is thus formed, one stimulant leading on to another.

The above is necessarily but the merest outline of the subject under consideration. Those interested will find Haig's works, enumerated in the bibliography at the end of this book, well repay perusal. It is of course difficult for a layman to pass judgment on the scientific truth or falsity of Haig's explanations of the action of xanthins on the human body, when the medical profession differ among themselves on the matter. But whether his theories are correct or not, for the practical man the fact remains that an ever-increasing body of people, including a section of the medical profession, find by actual experience that a diet free from xanthins procures them relief from a large and varied assortment of different maladies, and keeps them in better all-round health

and fitness than a diet containing xanthins, such as flesh diet.

It is precisely the great extent of the claims which are made for a diet free from xanthins which should hold our attention ; for there can be little hope, for a long time to come, of finding 1500 separate cures for the 1500 odd diseases catalogued in the pharmacopœia, but what we may hope to find are the *pre-disposing causes which make diseases possible* ; and it would seem that nothing would be more likely to be one of these fundamental, root causes than xanthins, or *poisons*, in the blood, derived from the food daily eaten.

CHAPTER VIII

VEGETARIANISM AND FLESH-EATING: A REVIEW

"Wherefore fly no opinion, 'cause 'tis new,
But strictly search, and after careful view,
Reject if false ; and embrace it if 'tis true."

LUCRETIVS

"The future is with the vegetarians."

VIRCHOW

IT is proposed in this chapter to pass briefly in review the principal facts and arguments bearing on the respective merits of flesh-eating and vegetarianism, both those that have already been set forth, and others not yet dealt with.

The first, and perhaps the most fundamentally important, fact to be ascertained in solving the problem of diet is the nature of the food for which man's digestive and assimilative machinery is designed. Scientists, as we saw, affirm in the most emphatic manner that man was intended by nature to be frugivorous, or fruit-eating, the word being employed in a wide sense. One sometimes hears it said that primitive man, before he learnt the art of tilling the ground, clad in skins and living in holes and caves, was carnivorous, living chiefly by hunting and fishing. It may well be that this was so, but he does not seem to have lived in this way sufficiently long to have altered his natural constitution or structure, which still remains frugivorous.

If man had been designed to be carnivorous, his

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natural instinct would be expected to show some trace of the fact ; it is significant to note that the sight of raw, bloody flesh, so far from attracting men, fills most people, and none more so than young children, with loathing and disgust. It is also well known that most children at first dislike meat, and only get to like it after they have been made to eat it, thus suppressing their natural antipathy to such food.

Chemical analysis, as we saw, establishes the fact that everything required for the nutrition of men is contained in the vegetable kingdom. It would indeed be surprising if this were not so, when we find most of the strongest and most useful animals living on vegetable foods. Thus, of domestic animals there are the ox, which performs nearly all the heavy work of ploughing, hauling, etc., in many parts of the world, the horse, camel, reindeer and elephant ; of wild animals the buffalo, bison, hippopotamus, zebra and stag, as well as the chimpanzee, orang-outang and gorilla, well known for their prodigious strength. The strongest flesh-eating animals, the lion and tiger, are of no use to man, but are fierce, restless, destructive creatures, exterminated by man wherever the chance occurs. The dog and the cat may be said to be the only carnivorous animals of any service to man, and it is a curious fact that even of these the dog, though undoubtedly carnivorous in constitution, is found by many owners to thrive best on vegetable food, while recent experiments developed the fact that hounds had more endurance when fed on vegetable than on flesh diet.

The popular notion that, the ox being a strong animal, men will become strong by eating the flesh

of oxen, is but little removed from the Red Indian's belief that by devouring the heart of a brave enemy he will himself become brave. The strength of oxen is not in their flesh, but in the food they eat; the flesh or muscles may be said to correspond to the cranks and rods of a steam engine; but the power of engines is in the steam, the food of the engine, not in steel rods.

Another crude idea, apparently still held by some ignorant people, is that, men's bodies being made up of flesh and blood, flesh and blood are the best things to feed them on; an elementary acquaintance with the functions of food (Chapter III.) is sufficient to explode this idea. It may be pointed out, however, to those who entertain such notions, that to be logical the *whole* body of an animal should be eaten, not some parts of the flesh only, but bones, skin, hair, blood, bowels, etc., as is done by true carnivora.

In spite of the fact established in Chapter V.—viz. that men, both races and individuals, can and do thrive on vegetable diet—it is still sometimes urged, as a proof of the superiority of flesh diet, that the most powerful nations of the present day are large consumers of flesh, and hold in subjection most of the non-flesh-eating races. It must be remembered, however, that, great as may be the influence of diet, it is very far from being the only factor in determining a nation's history; mental, social, political, economic, geographical, and other conditions play a greater part in moulding the destiny of a nation than what the people of the latter have for dinner. Man determines the dinner quite as much as the dinner determines the man. John Bull (who by the way is

represented with a red, apoplectic-looking, not to say coarse, face and an enlarged abdomen, neither a very beautiful nor a very healthy-looking individual) may for all we know be rich and powerful, not *because* of beef and beer, but *in spite of* beef and beer. It is an interesting fact that meat-eating, on anything like the present scale, is a custom of comparatively recent growth. Although we read of the wealthy classes of the middle ages, the barons and their retainers, consuming large quantities of fleshmeat, we also read that the diet of the great bulk of the nation, the peasantry, was almost wholly innocent of flesh, and consisted of such foods as oatmeal, brown bread, milk, and the like. McCulloch says that, "so late as 1763 the slaughter of bullocks for the public markets was wholly unknown, even in Glasgow, though the city had then a population of nearly 30,000." Dr Keith says that "in the twenties and thirties, the food of the working man, and also of the most of the upper classes, consisted mostly of milk, eggs, fish, oatmeal, potatoes, and a few other vegetables. There was no baker or butcher in the parish." The case was much the same with the Romans, whose soldiers marched, fought, and won their empire chiefly on corn; meat-eating and habits of luxurious living became prevalent only in the latter days of Rome, and the decline and decay of the Empire accompanied the introduction of these habits. It is significant that it is precisely during the last few generations, when disease and physical deterioration have become so marked, that flesh-eating, with many another luxurious and harmful habit, has sprung up among the people of this country.

How far the diseased and deteriorating physical condition of this and other nations, of which so much is heard nowadays, may be traced to the growth of the flesh-eating habit, is of course a difficult question. It should be remembered, however, that, from such knowledge as we have, disease does not form part of the normal design of nature; thus animals of all kinds, under natural conditions, seldom become diseased; it is only under artificial conditions, when the design of nature has become perverted, that ill-health arises. The principle is the same as that on which an instrument or tool, which is capable of performing for a great length of time the work to which it is adapted, soon becomes useless or breaks when put to another purpose. It would, therefore, arguing from first principles, not be surprising if the eating of flesh-foods, for the digestion of which scientists affirm man's constitution is not designed, may not be largely to blame for the unsatisfactory and discreditable conditions of health in which so many "civilised" peoples find themselves to-day.

It may, however, be urged that the artificial conditions of civilisation render artificial foods necessary or desirable. For such conditions it would seem that the most suitable foods would be such as are easy to digest and assimilate, and as pure as possible, so that there may be little tax on the system in ridding itself of waste products. We have seen that flesh-foods have little to recommend themselves on this score, because they contain quantities of effete matter which, instead of lightening, increase the burden of getting rid of effete products.

In making these contentions we are not attempting

to demolish an already existing theory, but are offering a theory where no serious theory existed before. For it should not be forgotten that it is not a careful study of the problems of diet and nutrition, or an endeavour to arrive at the food best for himself, which has led "civilised" man to his present diet, but quite other motives, of which custom, love of luxury, and increasing ability to buy expensive foods, are perhaps the most important.

In addition to the perversion of nature's design as a disease-producing factor, there is also the factor, as we saw in Chapter VI., of the germs of disease being actually present in the food eaten, which, if it does not directly induce disease, may do so indirectly by lessening the disease-resisting powers of the organism — *i.e.* the health-maintaining amœbæ which scientists assure us abound in our blood, are obliged to divert part of their strength into fighting disease germs unnecessarily introduced with the food daily eaten. The theory of xanthins (Chapter VII.) affords another reason why, *cæteris paribus*, flesh-eaters would be expected to have less disease-resisting powers than non-flesh-eaters.

The facts recorded in Chapter V. should be sufficient to dispose of the objection often heard that vegetable diet is only suited to certain climates. Physiologically the only important difference in diet necessitated by climatic conditions seems to be in the amount of hydrocarbons (fats and oils) required, and of course there is abundance of these substances—*e.g.* in nuts, vegetable oils, etc.—in the vegetable kingdom as well as in the animal kingdom. In the theory of xanthins is to be found an explanation of the fact, commonly

observed by vegetarians, that vegetable diet renders one less susceptible to extremes of climate, both of heat and cold, than does flesh diet.

In carnivorous England it is quite common to hear people say that if animals were not killed for food the country would soon be overrun by them. A moment's thought, however, exposes the groundlessness of such fears. Having almost absolute control over the breeding of animals raised for food, we can regulate the numbers to our requirements; if flesh-food were no longer demanded it would be a simple matter to cease breeding the vast numbers of cattle, sheep, pigs, poultry, etc., which are now bred for the slaughter. There would then be no more danger of being overrun by these animals than there is now of being crowded out by squirrels, hedgehogs, donkeys, dogs, horses, or being pecked out of hearth and home by robins, starlings or goldfinches. Neither, if animals were allowed to die a natural death, would there be any difficulty in disposing of the dead bodies than there is now in disposing of the bodies of donkeys, horses, etc. The idea, apparently seriously entertained by some people, that it would be wasteful not to eat the corpses of cows, etc., is to degrade men to the level of wolves, jackals and vultures, which in other countries perform the function of disposing of carrion.

The use of the word corpse in connection with flesh-eating, despite the indignation of flesh-eaters, cannot be regarded as other than perfectly legitimate. It is stated as a scientific fact that a dead body commences to decay from the moment life is extinct; and a specialist says "it must be re-

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membered that so-called maturing of beef is simply reducing it to an early stage of putrefaction." Offensive as it may sound, the use of the term corpse, or even decaying corpse, is nothing more than calling a spade a spade, and it is just as well that the fact should be recognised. In any case no one could repudiate the expression in reference to so-called "high" game, venison, etc.

Of the greatest interest and importance is it to make a comparison between the productive power of land under pasturage and under the plough. Alexander von Humboldt says that a piece of land sufficient to support one huntsman would support 10 agriculturists, or 100 fruit-eaters. Francis Newman, Professor of University College, London, gives the following figures:—

100 acres devoted to sheep raising would support 42 men :	proportion 1
„ dairy farming „ 53 men :	„ 1 $\frac{1}{4}$
„ wheat „ 250 men :	„ 6
„ potatoes „ 683 men :	„ 16

If only 20 millions of the 35 million acres now devoted to grazing in the British Isles were brought under wheat, then at a moderate estimate the wheat so produced would support 40 million people. The British Isles could therefore produce sufficient food to support the whole population, if the latter were vegetarians, instead of flesh-eaters.

It is an interesting fact that the feeding up of animals for food on corn, barley, etc., involves a net loss of nutriment. Thus Youatt, the veterinary surgeon, says that 3 $\frac{3}{4}$ lbs. of barley make 1 lb. of pork—*i.e.* more than 5 lbs. of *solid* nutriment are used to produce 1 lb. Sir John Lawes, in a report

on experiments on feeding, says that "the average consumption of corn per pig was 60 lbs. per week, which produced 10 to 12 lbs. of meat per week"; in other words more than 7 lbs. of nutriment was used to produce 1 lb.

Another point of national importance is that "in a region given over to grazing a small rural population suffices to tend the cattle; hence the rural areas are emptied of men, who are constantly driven out of the country into the town. This is a grave national evil" (NEWMAN).

A comparison between the costs of vegetable and flesh foods is instructive. In order to obtain daily 4 oz. of proteid and 10½ oz. of force-producing substances, the amounts laid down by Lord Playfair in a Government Bluebook as necessary for an adult man, it would be necessary to consume weekly :

lb. oz.		s	d	
9 3	of butcher's meat, price about	6	10	proportion 100
or 5 13	of cheese	3	4	49
or 21 5	of bread	2	8	39
or 10 15	of oatmeal	2	3	33
or 7 15	of dried peas	2	0	29

while the force-producing substances could be supplied by :

lb. oz.		s	d.	
26 0	of butcher's meat, price about	19	6	proportion 100
or 14 0	of cheese	8	2	42
or 13 13	of dried peas	3	5	18
or 18 10	of bread	2	4	12
or 11 7	of oatmeal	2	4	12
or 38 8	of potatoes	1	7	8

The invaluable figures of Seebohm Rowntree¹ show

¹ See "Poverty, A Story of Town Life."

that working classes in York, with an average income of £1 per week, of which one half is spent on food, could, if wholly vegetarian, purchase food of equal energy-value for a trifle (1 per cent.) more than one half of what they actually spend on their mixed diet.

The annual meat bill of the nation amounts in one way and another to about £150,000,000. The above figures make it clear that even a partial change to vegetarianism would effect a huge national economy, and enable large sums of money annually to be spent on something more profitable and healthful than flesh-meat.

A difficulty sometimes foreseen by flesh-eaters in a widespread adoption of vegetarianism is a shortage of such articles as leather, bone, soap, etc. Such a difficulty, however, would be but trifling and temporary; if the present abundant supply of skins from slaughtered animals were to run short owing to a diminution of the flesh traffic, there is every reason to hope that it would not be very long before man's inventive genius found some efficient substitute for leather. Several of these substances are in the market at present, but the cheap supply of animals' skins renders competition difficult. Artificial ivory and bone of course have been manufactured for years, while vegetarian soaps, made from olive and other vegetable oils, are by many people preferred, on the score of cleanliness and for other reasons, to soaps prepared from animal fat.

In a carnivorous country such as England, people are apt to get an erroneous impression of vegetarianism from what they see of such few vegetarians as there are amongst themselves, many of whom, it

must be admitted, are far from being good advertisements for their diet. It must be remembered, however, that in this country a large proportion of vegetarians are such for medical reasons—*i.e.* they adopt vegetarianism purely as a remedy for ill-health—and are therefore entitled to be regarded rather as invalids under treatment than as fair specimens of vegetarianism. Again, vegetarians in this country are generally at the great disadvantage of getting more opposition, often ridicule, than sympathy or assistance from other people, and often experience great difficulty in obtaining sufficient food, and of the right kind, at the tables of meat-eaters. Further, and this is an important point, many English vegetarians, especially perhaps of those who adopt a bloodless *régime* for humanitarian motives, are as ignorant as ordinary flesh-eaters are on matters of food-value, and accordingly make grievous errors in the materials they select for their food. During the last few years, however, largely owing to the activities of vegetarian and food-reform societies, knowledge of these matters has been spreading among the people, and is bearing fruit, not only among vegetarians but also among flesh-eaters. But the evidence of vegetarian races, coming from all quarters of the globe, and accessible not only to those whose fortune it is to travel and observe with their own eyes, but to all through the media of books, is of more value than that of a few individual specimens in this country, who labour under disadvantages such as those enumerated.

The fact that the great majority of medical men do not advocate vegetarianism counts with many

people, not unnaturally, as a strong argument against its soundness. With all due respect to the medical profession, however, it must be remembered that doctors, as well as other men, are very largely the creatures of habit, convention and orthodoxy, and are as prone to accept without question the customs of the times they live in as other men are. The subject of diet, in fact, as previously mentioned, does not form part of the ordinary curriculum of the medical student. As Dr George Black recently said in the Memorial Hall, London, a medical man "as a rule knows little or nothing of dietetics . . . having no personal knowledge of the values of a non-flesh diet, he dare not experiment lest harm should result, and he be blamed by the relatives and incur the opprobrium of his professional brethren. It is this, rather than want of sympathy with the Vegetarian movement, which prevents medical men from adopting it in their practice."

It is significant to note that of recent years diet has been more and more attracting the attention of medical men, and that an increasing number of them are advocating vegetarianism, while almost all are recommending the consumption of *less* flesh-meat than people are now in the habit of eating. The soundness (or the reverse) of vegetarianism must, like all other questions, be judged on its own merits alone, and not by majorities who have never studied the matter scientifically. It has been truly said that "the history of progress is the history of minorities."

Another way in which flesh-eaters obtain a false impression of vegetarian diet is that of trying a casual meal now and then without meat; it is quite

common to hear them say on such occasions that they felt ravenously hungry an hour or two afterwards, and so, they say, though vegetarianism might suit other people it would never do for them. No diet, however, can be fairly judged in this casual way; in the first place, those who are accustomed to the stimulation of flesh foods will certainly feel the want of such stimulation if they *suddenly* adopt a fleshless diet, even for a single meal; and in the second place, their systems having become accustomed to digest principally flesh-foods, they will probably find difficulty at first in digesting other foods, especially if a *sudden* change is made. It is as though a confirmed toper were to knock off all at once alcoholic drinks, and take to water; he would certainly report most unfavourably on the latter as a beverage. The matter of changing from one diet to another will be dealt with later on.

It is thought that the facts and arguments thus briefly adduced in this and the preceding chapters will be sufficient to show that, popular prejudices notwithstanding, vegetarianism is very far from being a fad or a "crank," but is a system based on sound, scientific principles and, if widely adopted, full of bright promise for the bettering of the physical and economic conditions of nations now addicted to the habit of flesh-eating. For kreophagy, or flesh-eating, on the other hand, in our opinion, no such sound basis of chemical, physiological, economic or empirical truth can be found.

But custom, convention and prejudice die hard, and though the change has commenced and knowledge is spreading, we fear it will be many years

before Western peoples give up their present habits and return to the way marked out for them by nature and by science ; two centuries, says Alexander von Humboldt, does it take for a new truth to be recognised and acted upon.

The method of treatment of the remainder of the subject-matter of this book will be such as to apply, in degree, both to flesh-eaters and to vegetarians.

CHAPTER IX

ON MASTICATION

ALTHOUGH it is well known that, in almost every department of activity, the method of doing a thing is often as important as the thing done, it is a curious fact that until recently the question of *how* to eat has been largely overlooked, even by many of those who have made some study of the problem of *what* to eat. To once again make use of the steam-engine analogy, it is well known that stoking a furnace is a fine art; if fuel is not put on the fire in the correct way by a skilled fireman, fuel will be wasted, the full amount of heat will not be generated, and the efficiency of the engine will be impaired. Similarly, stoking the human engine incorrectly may result in imperfect combustion (*i.e.* digestion), giving rise, in addition to waste of fuel, to a clogged system and loss of efficiency.

It should be remembered that the mouth is as much part of the digestive machinery as are the stomach and intestines; the functions of the mouth are two: (1) mechanical division of the food; (2) insalivation. The importance of the former is too apparent to need much emphasis: bearing in mind that no food can be absorbed into the blood until it has been reduced to a liquid state, it is evident that if the teeth fail to perform their task thoroughly, the

work of the stomach and intestines will be rendered extremely difficult. Swallowing food in lumps may render stomach digestion so slow as to produce indigestion, or fermentation; the taking of more food will force the fermenting mass into the intestines, where the process will be continued, the effort of the system to rid itself of such matter resulting eventually in putrefaction.

The second, or chemical, function of mastication is perhaps even more important than the mechanical function; "this fact should never be forgotten," wrote Sir Henry Thompson in 1886, "that the mouth is the cavity in which that large portion of our food which consists of bread, and farinaceous foods and vegetable tubers, ought to be digested by means of mastication and insalivation — *i.e. thorough mixing with the saliva.*" The importance of recognising this fact can scarcely be over-estimated; most people seem to regard saliva merely as a sort of lubricator which makes it easier to swallow food, and to think that most mastication is required by tough foods such as flesh, and least by soft foods such as porridge, bread, or milk puddings. As a matter of fact the exact reverse of this is the case; flesh is digested in the stomach by the gastric juice and needs no saliva; starchy and sugary, or farinaceous, foods are digested in the mouth and intestines, and need much saliva. It is one of the absurdities of our present habits of diet that the foods which require most mastication, or rather insalivation, are the ones least likely to get it, owing to their being generally prepared in a pappy or sloppy form; hence the common-sense of what many doctors and others are now advocating—viz.

of cooking such foods in a drier form, or eating them in conjunction with dry foods, such as toast or biscuit. The same principle applies to liquid foods such as milk, which should be regarded as foods rather than drinks, because they require for their digestion thorough mixing with saliva.

It will be interesting and instructive to trace out some of the effects on the system and general health of thorough mastication of food; it affords a good illustration of how an apparently simple cause may produce far-reaching effects in almost countless directions.

From what has been already said, as well as from first principles, it is evident that mastication, by aiding digestion at the very outset, will materially benefit the whole digestive process. Prof. Chittenden says "it seems obvious, in view of the relative large bulk of starch-containing foods consumed daily, that habits of thorough mastication should be fostered, with the purpose of increasing greatly the digestion of starch at the very gateway of the alimentary tract. It is true that in the small intestine there comes later another opportunity for the digestion of starch; but it is unphysiological, as it is undesirable, for various reasons, not to take full advantage of the first opportunity which nature gives for the preparation of this important food stuff for future utilisation. Further, thorough mastication, by a fine comminution of the food particles, is a material aid in the digestion which is to take place in the stomach and intestine."

It is also clear that, where digestion is more complete, there will be less waste, and so less food will be required. The importance of this point cannot

be too strongly insisted upon. Every particle of undigested food is a direct drain on the system, for it has to be forced through the folds of some twenty-eight feet of intestinal canal, a process which involves the expenditure of a considerable amount of force, and leaves so much less force available for brain, nerves, heart, muscles, etc. The total amount of heat and energy available for all the needs of the organism is derived, not from the food eaten, but from the food digested, and therefore the less undigested food there is, the more will be the energy available for useful activities.

Thorough preparation of food in the mouth is found to have so great an effect in increasing the digestibility of foods, even of those which have a reputation for being difficult of digestion, that Dr Harry Campbell, who has made special study of this matter, wrote in *The Lancet* of 11th July 1903 that he was of opinion that all the more common articles of diet "tend to be equally digestible when reduced to the same degree of comminution." And again, "provided they be sufficiently insalivated, there are few starchy foods which are indigestible, not even excepting the proverbially indigestible new potato."

It follows that, where digestion is more complete, and waste matter is reduced to a minimum, there will be less putrefaction in the intestines. It is a curious fact that the excreta of animals such as the horse, cow, camel, sheep, rabbit, etc., are cleanly and inoffensive compared to that of most human beings. "Most" is said advisedly because it has been found by some people (and the cases are well authenticated) that the habit of thorough mastication and

insalivation of food has rendered digestion so perfect and so complete, that what may be called the "digestive ash" is, besides very small in quantity, *entirely inoffensive and innocuous*, even when kept for some time, having "*no more smell or odour than a hot biscuit.*" The significance of this point is apparent, for it is well known that putrefaction of undigested food in the intestines evolves poisonous products which are a continual menace to the organism and may, if absorbed into the blood, seriously impair the health.

The fæces being so much reduced in quantity, it follows that the chances of constipation or diarrhoea are much less than might otherwise be the case.

One of the most noticeable results observed by those who practise very thorough mastication is a great improvement or refinement in the sense of taste, which leads to a far greater gastronomic enjoyment of food than was known previously. The reason for this appears to be that the flavour of foods is carried to the taste buds in the mouth through the medium of the saliva, and that the full delicacy of flavours does not appear until the saliva has commenced to dissolve and act on the food material, which generally is a matter of several seconds after the introduction of food into the mouth. The conversion of starchy matter into maltose (a kind of sugar), which is the most important function of the saliva, probably accounts for the subtle, delicate sweetness of even such plain foods as dry bread or potatoes, when the latter have been properly insalivated. It is common to hear people who have been induced to give thorough mastication a trial say that the enhanced appreciation

of food which results comes as quite a revelation to them. So marked is the improvement in the palate, and in its ability to appreciate delicate flavours, that all desire for flavourings, spices, sauces and condiments of every kind automatically disappears, the palate rejecting such artificial "spurs," not only as unnecessary, but as drowning with their comparative coarseness the subtler and more delicate natural flavours of foods. Parenthetically it may be pointed out that pepper, mustard, Worcester and other sauces, *et hoc genus omne*, have no intrinsic value as foods, but are simply stimulants or irritants, which may perhaps provoke a jaded palate into artificial life, but do so at the expense of the natural sense of taste, which they tend to destroy in time, as is evidenced by the fact that the habitual use of strong flavourings will in time make unflavoured food appear insipid and tasteless. Most of these substances—*e.g.* mustard, pepper, and many of the sauces in common use in this country—are also known to have a directly irritating and injurious effect on the delicate walls of the stomach and intestines. Those who cultivate the habit of thorough mastication will find that their palate tolerates little or none of these substances. It is significant to note also that a palate thus trained will as a rule tolerate but very little flesh-meat, alcohol, tobacco, or strong tea.

The act of moving the jaws in mastication stimulates the salivary glands to activity, hence, on the principle that use increases, and disuse diminishes, the activity of a gland, it is usually found that careful attention to mastication in a short time greatly increases the flow of saliva in the mouth, thus mak-

ing thorough insalivation of food a quicker and easier process.

When careful mastication is carried out, it will be found that a far less quantity of food than before is sufficient to satisfy the appetite ; natural instinct thus corroborates the fact already pointed out—viz. that the more complete digestion brought about by better mastication renders less food necessary. This phenomenon of hunger being fully appeased by a much smaller quantity of food is one of the first, and probably one of the most important, results observed by those who adopt the habit of thorough mastication.

It appears that, given fair treatment, the instincts implanted in man by Nature, afford an accurate and trustworthy guide to the true requirements of the body for nutriment, both as to quantity and quality. Dr Ernest van Someren says on this point, "I can promise, to each and all who may intelligently practice the principles of Thorough Buccal Digestion a complete knowledge of their body's food requirements, or, as a patient of mine tersely put it, they will learn the way to 'run their own machines.'" That the appetite of many, or most, people is not always a safe guide to follow, is evidenced by the advice so often given by medical men and others, that one should always stop eating before one's hunger is fully appeased ; but many people of course have not sufficient will power to do this, with the result that they suffer from the effects of over-eating ; those whose digestions are strong store up adipose tissue and become stout, while those with weak digestions suffer from indigestion in one of its myriad

forms. So reliable a guide does the appetite become, as a result of proper mastication, that many people have found that from being stout they have become thinner, while others from being lean have become fatter; in both cases the body seems to tend to revert to a normal condition.

Mastication still further promotes digestion by stimulating, through reflex action, the flow of gastric juice in the stomach. Dr Harry Campbell writes, "It is now known that the act of mastication influences the stomach reflexly, promoting the flow of gastric juice and thus preparing the stomach for the entrance of food into it. If the œsophagus of a dog is cut so as to allow the swallowed food to escape instead of passing into the stomach, it is found that the mastication of food causes a considerable flow of gastric juice. Food introduced into the stomach unaccompanied by mastication is less effective in promoting the gastric flow. It is probable that the influence of mastication on the flow of gastric juice is largely produced through the medium of psychic influences, for the more efficient the mastication the more is the sense of taste affected."

Other minor beneficial effects claimed for mastication are that the active movement of the jaws stimulates a healthy flow of blood to the face and gums, and also to the region of the nasal passage, the latter fact tending, according to Dr Campbell, to prevent adenoids. The same authority says that "mastication stimulates the heart and so promotes the general circulation . . . whatever the explanation there can be no doubt of the fact"; he also holds that a vigorous use of the teeth promotes a

healthy condition of the latter ; he says "those who masticate efficiently suffer much less from dental caries and its complications (such as abscess at the root) . . . than those who are accustomed to bolt their food."

It may perhaps seem that the benefits claimed to result from mastication are exaggerated, and out of proportion to such a simple cause. It must be remembered, however, that the strength and vitality of an organism are derived from the digestion of food, and that therefore anything which beneficially affects the digestive process (and it is abundantly proved that mastication at least does this) may improve the general condition of the organism to almost any extent. Moreover, what has been said is not mere theory, but a record of actually observed facts ; many of them have come under the notice of the writer ; all are recorded in two books by Horace Fletcher, "The A.B.-Z. of Our Own Nutrition," and "The New Glutton or Epicure." The history of these books is interesting ; although an athlete in youth, at the age of forty-four Fletcher found himself extremely corpulent, and so unhealthy as to be ineligible for insurance. After some thought on the matter he adopted the habit of thorough mastication ; in a short while his corpulency disappeared and his general health improved in a manner that seemed almost miraculous. Having a strong conviction that he had stumbled on a discovery of the highest importance to the human race, he brought the facts to the notice of several of the leading physiologists of the day, who investigated the matter scientifically ; their results are recorded in "The

A.B.-Z." above referred to, and a condensed summary of some of the principal ones has been given in this chapter. The high opinion which the scientific world has of Fletcher's discoveries may be gathered from the fact that a proposal has been formulated "to found an international laboratory of research for the study of nutrition in all its aspects." The proposal states that "certain very noteworthy observations made by Messrs Horace Fletcher and Ernest van Someren have shown that an excessively prolonged mastication and insalivation of food lead to remarkable results in the diminution of the total quantity of food necessary to keep the body in a state of health, and to, as is alleged, a remarkable improvement in the digestive functions, as well as of the general health of the individual. It appears highly important thoroughly to investigate the remarkable phenomena discovered, and to determine how far they may lead to a modification of or improvement in the dietary of healthy individuals and of persons in a state of disease." Those who have expressed willingness to act as scientific assessors in the work are Sir Michael Foster¹ for England; Pawlow for Russia; Bowditch, Chittenden and Welch for America; Mosso for Italy; Kronecker for Switzerland; Zuntz for Germany; Heger for Belgium, and Dastre for France.

In addition to the recognition by science of the importance of Fletcher's discoveries, the great benefits to the power of digesting food and to the general health resulting from "Fletcherism" (as careful mouth treatment of food has come to be called), are

¹ Since dead.

testified to by a large number of individuals in America, England, and other countries.

The mouth treatment advocated by Fletcher is a very thorough one. Such rules as that ascribed to Gladstone, of chewing each mouthful 32 times, though better than nothing, are obviously purely empirical and unscientific. Why 32? Why not 22 or 52 or 92? And why the same number for, say, meat as for porridge? The only scientific method is to masticate until every particle of food is reduced *to a liquid condition, and is thoroughly mixed with saliva.*

One of Fletcher's discoveries is what is called the "Swallowing Reflex." Tests have shown that all foods when introduced into the mouth are acid; a part of the back of the throat, the epiglottidean folds, possesses the power (a power lost by most people, but capable of being restored) of throwing off from it anything acid, and only allowing to pass what is alkaline. As mastication proceeds the alkaline saliva gradually neutralises the acid of the food, and the latter slips down to the "epiglottidean folds," which, if they retain their power, throw back into the mouth for further treatment any portions of food which may not have been completely "reduced" (in the chemical sense) to alkalinity by the saliva. The swallowing reflex thus seems to act as a natural guardian of the stomach, refusing to let pass anything that has not been properly treated in the mouth, or that is harmful to the system and insoluble in saliva. The reflex reappears in most people after a few weeks of careful mastication.

A person who "Fletcherises" correctly will masticate every particle of food *as long as it is possible to*

do so—i.e. until the food is no longer rejected by the swallowing reflex, when *involuntary* swallowing will take place. To swallow *voluntarily—i.e.* by a conscious effort—is to abuse the reflex and to force upon the system food that has not been properly prepared by the teeth or saliva for further digestion by stomach or intestines. A further interesting fact is that taste persists in food until the latter has been completely neutralised by saliva, when it disappears. The rule may therefore be stated in the form that *mastication should be continued as long as there is any taste left*. An illustration is thus afforded of the cunningness of the designs of Nature, who offers to her creatures every inducement to do what is best for them and for herself.

Many who hear of "Fletcherism" for the first time think that the system would necessitate a long time being spent over meals. After a little practice, however, owing to less food being required, and to the greatly increased flow of saliva, it is found that this is not the case. Fletcher for instance finds that twenty minutes twice a day is sufficient for his meals. There is perhaps a certain amount of truth in the objection that the system curtails conversation, but, for the reasons just mentioned, this curtailment is far less than might be imagined; in fact, the difference in this respect between one who masticates thoroughly and one who does not need be scarcely noticeable at a meal.

Some people appear to think that there is something unpleasant or disgusting in "going on chewing like that." Needless to say such a feeling is purely a fictitious creation of the mind and only exists as

long as the mind permits it to exist. Physiologically, there can scarcely be anything unpleasant in treating the human body in the way Nature intended it to be treated ; on the contrary there is reason rather to regard it as disgusting to violate Nature's laws, and to bolt one's food in lumps, probably thereby creating indigestion and intestinal putrefaction.

It must be borne in mind that a habit of many years' standing cannot be thrown off, any more than a new habit can be formed, in a few days. It will probably take most people several weeks of careful attention before they will have forgotten how to bolt food, and have firmly established the habit of thorough mastication and complete insalivation of their food. Once the habit is acquired the labour spent in acquiring it is not likely to be regretted.

CHAPTER X

WHEN TO EAT

"No one was ever injured by intelligently and calmly waiting for an appetite. No one ever starved to death for lack of appetite. Most human ills come from forcing appetite, anticipating appetite, abuse of appetite in some form."—
HORACE FLETCHER

" . . . *Abstinence*: nay *Fasting* is my plan;
Heaven's antidote against the sins of man.
The time for temperance, my friend, is past;
To live, to eat with pleasure, you must *fast*.
Foul luxury's the cause of all your pain;
Nature and reason bid you then abstain

Fast and fear not; you'll need no drop or pill:
Hunger *may* starve, excess is *sure* to kill."¹

RICHARD GRAVES

IN animals, except sometimes when confined in artificial conditions, natural instincts of hunger and thirst are observed to be infallible guides to the real needs of their bodies for food and drink. In man, however, memory of past and anticipation of future enjoyments, and a mistaken notion of the real meaning of hunger, frequently over-ride natural instinct and induce him to eat and drink in the absence of true hunger and thirst. Thus many people are found (the writer recollects one who was a medical man) who will say that they never really enjoy a meal, but look upon eating more or less as a duty to be performed when meal time comes round.

Such people are generally suffering from indigestion in some form or other, and the fact that they have no genuine hunger is, if only they could be got to see it, the voice of Nature, in other words of the stomach and its collaborators, saying in as plain terms as possible that they do not require food. The digestions of such people are generally in arrears and never get a chance to "catch up"; if one or two meals were omitted, until *genuine hunger* called for food, the system would have a chance to work off arrears and would then, as soon as it needed more food, say so plainly, by the voice of hunger. It thus appears, from first principles, that to eat in the absence of hunger is to violate nature and, probably, to bring trouble upon oneself; later it will be shown that this common-sense view is corroborated by the researches of physiology, as well as by the practical experience of many individuals.

Of late years there has been an outcry, from both the medical and lay world, against the excessive number of meals indulged in by most English people; for while the average Britisher takes four or even five, many other races, notably Orientals, thrive on at most two meals in the day. In Chapter III. it was pointed out that probably the principal reason why flesh-eating races are almost always found to take more meals in the day than non-flesh-eaters, is that fleshmeat acts as a stimulant, it being well known that every stimulation is necessarily followed by a corresponding depression, which creates a desire for further stimulation. Whatever the explanation, there is no doubt about the fact that vegetarians nearly always find that they do best

on a smaller number of meals than meat-eaters appear to require.

The sensation of hunger is usually described by flesh-eaters as a sort of "sinking feeling," distinctly unpleasant, in the region of the stomach, which becomes more insistent the longer food is withheld. There is good reason, however, to believe that this feeling is not necessarily characteristic of genuine hunger; thus, many in this country who used to experience the feeling as flesh-eaters affirm that since the adoption of vegetarianism they never suffer from this discomfort; the author has also observed that vegetarian natives of India do not appear to experience the feeling, even though their meal time is delayed many hours. The feeling appears to be due to abnormal or morbid secretion of acid in the stomach, from which meat-eaters, for some reason, are especially liable to suffer. The sensation may generally be temporarily relieved by a glass of hot water, which dilutes the acid and cleanses the stomach.

Another cause of the "sinking feeling" is fermentation in the stomach, especially when such foods as porridge, pastry, etc., are bolted almost wholly innocent of saliva. Eustace Miles quotes a case, typical of many, where a woman avowed that she was ravenously hungry an hour or two after dinner, insisting that her stomach was perfectly empty, and saying that she was sure she would faint for want of food if supper were not provided immediately. On inserting a stomach pump, however, the last meal was exposed to view in an undigested and fermenting state. It is unfortunate

in a case of this nature, that taking more food will, by diluting the fermenting mass, and by absorbing some of the excessive acid in the stomach, remove the unpleasant "empty" feeling. Similarly, more food (particularly nitrogenous or proteid matter), by absorbing the acid, will temporarily remove the feeling which is produced by morbid acid secretion in an empty stomach. In both cases of course the improvement is only apparent, matters being in reality in a worse condition after than before the extra food, the latter being frequently not really required by the system, but only an additional burden to it.

It is not easy to define accurately the hunger sensation in an individual with a perfectly healthy and normal digestion; this much, however, can be said, that there is nothing uncomfortable about it, nor is it in any sense a "craving" or demand that insists on early satisfaction; in fact its non-insistence is perhaps its chief characteristic. Dr Keith says on this point, "I could omit a meal at any time without discomfort. This I have long looked on as the best proof of perfect digestion." Perhaps the best description of natural hunger is that of Fletcher, who describes it as "a feeling that food would taste delicious." Dr Dewey also says "natural hunger is hunger in repose, that can wait longer easily if necessary—it is not attended with that nervous haste and impatience that incites bolting at the table. *Natural hunger is never in a hurry.*" It is true that this sort of hunger is seldom met with among flesh-eaters in this country, but most vegetarians, both in this and other countries, appear to experience it.

To return to the matter of number of meals. For some years past a good deal has been heard of the no-breakfast plan. The name seems to have originated with Dr Dewey, who has written a book of that name.¹ One of Dewey's main contentions is that most people would be far better if they omitted breakfast and took the first meal of the day about noon or later. The principle is that the digestive organs are frequently not prepared to undertake the digestion of fresh food the first thing in the morning, but need several hours to prepare themselves for the task and to accumulate digestive fluids. Further, before any energy can be obtained from fresh food, energy has first to be expended on digesting it; on this principle therefore, if no energy is being absorbed by the digestion of food, the whole available energy of the system can be employed on active work, physical or mental—*i.e.* a man with an empty stomach ought, *cæteris paribus*, to be able to do better work than he would do if part of his force were being diverted to digesting the contents of a full stomach. An interesting illustration from nature of this principle is afforded by migrating quails who, preparatory to undertaking a long flight over water, which taxes their strength to the utmost, wait until their last meal is fully digested so as to be able to start with an empty stomach.

There is of course in this country a strong prejudice against commencing the work of the day on an empty stomach; the average Britisher clings to his breakfast, and generally makes a large and heavy one. Many people even force themselves to eat in

¹ See Bibliography, p. 251.

the morning, though they have no vestige of an appetite, seeming to regard it as a duty to "make a good breakfast." Dewey and others, however, have recorded almost innumerable instances where not only people who have no appetite, but many even of those who have an appetite for food in the morning (once they have got out of the breakfast habit), are far better when they omit the morning meal altogether. Not only do they find that they feel fresher and brighter and can do a better morning's work, but in addition many troublesome complaints arising from imperfect digestion have been found to be removed by this simple treatment. The long rest that is afforded to the digestive organs appears to enable them to recoup their strength, and to eradicate weaknesses, in a way that nothing else can.

Working on the same principle of rest to a weak or diseased organ, Dewey, Keith and others have found that, in a very large proportion of sicknesses of almost every kind, the simple plan of withholding food until a genuine, natural appetite returns, is the quickest and easiest way to cure. The records of cases treated on these lines (see Dewey's and Keith's books in Bibliography, p. 251) are both interesting and valuable, and are recommended to the reader. The line of reasoning is simple and clear: when anything goes wrong with a limb or other part of the body, rest is almost always looked upon as an indispensable element for cure; but, by some curious chain of reasoning, an exception seems to be made in the case of the digestive organs; for, even though the sick person has lost all appetite, and may even

have a decided disinclination for food, solicitous friends and even doctors force food upon the patient, telling him that he must "keep up his strength." The recorded cases alluded to demonstrate conclusively that, in a large proportion at least of ordinary illnesses, there need be no fear of collapse for want of food; long before actual starvation sets in, Nature will assert her need for food by giving the sick person an appetite. Dewey says, "My experience in the rooms of the sick had convinced me, long before I gave up my morning meal, that death from starvation was so remote as practically to exclude it from consideration." It should be remembered that while food is being withheld the system will live on its own tissues, absorbing first of all the fat stored up in the body. These afford a very easily absorbed form of nourishment, and there is practically always enough of them to last for days, or weeks if necessary, until the digestive organs are sufficiently recovered to undertake digestion of fresh food. Numerous cases are recorded where persons with bad forms of indigestion have lived entirely on their own tissues, taking no solid food at all (but plenty of water), for several weeks, even going about their ordinary work as usual, and, strange as it may seem, often feeling remarkably well and fit all the time: the fast is ended as soon as, and not before, appetite returns.

It is significant that animals, when unwell, almost invariably refuse food until they get better; in country places people are still found who adopt this old-fashioned remedy; the writer has frequently observed that natives of India usually abstain from

food when they are ill until appetite returns ; they seem to recognise instinctively that loss of appetite is generally the *effect*, and not the *cause*, of sickness. Dr Keith writes, "This I am convinced of, that in almost every case disease is aggravated by food taken when it cannot be properly digested, and that the suffering to the patient is enormously increased. I know this above all from personal experience ; for when ill I have often taken food as a duty when I had no desire for it, and I know now that I only prolonged my illness, and my misery as well. . . . I have the strongest conviction, after more than fifty years' experience, that the forced giving of food when it is not wanted is the cause of more misery, more aggravations of disease, and greater shortening of life, than all other causes put together." One of our best-known London specialists recently told the writer that he had cured many cases of dysentery and intestinal diseases of several years' standing by nothing but rest—*i.e.* he had put the patient to bed and given him no food, but only water to drink, until nature had mended the digestive machinery. Dr Haig, speaking of Dewey's book, says, "The chief point in this book is that temporary, complete starvation till there is once more a healthy appetite, is the best cure for a host of dyspepsia, debilities, depression, mental and bodily, and numerous other troubles, and that for similar less severe disturbances the great remedy is to leave out the breakfast, so as to give the stomach a long rest of 16 hours or more. It seems from internal evidence in Dewey's book . . . that his plans have been completely successful in a large number of cases, and it seems to me that his

logic is unanswerable, and that in his main contentions he is perfectly right." The great surgeon Abernethy seems to have had the same idea in mind in his saying, "Stop the supplies and the enemy will leave the citadel."

In addition to what may be called the common-sense way of regarding the custom of forcing food upon an unwilling stomach, the researches of Prof. Pawlow¹ have clearly demonstrated that secretion of digestive fluids is dependent upon psychic influences, the chief one of which is appetite. He has proved that where there is appetite fluids will be secreted, and where appetite is absent fluids will be absent also. "We may," he writes, "venture to say explicitly, APPETITE IS JUICE, a fact which at once displays the pre-eminent importance of the sensation."

To come back to the no-breakfast idea; although the bulk of English people still set such store by a "good" breakfast, there are other races who prefer to commence the day's work on an empty stomach; many of the natives of India and other Eastern countries, for instance, prefer this plan. On the continent of Europe, instead of the heavy English breakfast, a very light one of a roll and cup of coffee is the usual

¹ Pawlow claims to have exploded once and for all the old idea that secretion of gastric juice takes place under mechanical stimulation. He says, "I will introduce a very unexpected pronouncement relative to the assertion that mechanical stimulation of the stomach wall by food constitutes a reliable and effective means of calling forth the secretory work of the glands: This assertion, so categorically set forth in many text-books, and which consequently has gained hold of the mind of the physician, is nothing else than a sad misconception degenerated into a stubborn prejudice."

custom. The ancient Greeks are said to have taken only two meals in the day, the first at noon ; the Persians under Xerxes took their only meal of the day at midday ; the author of Ecclesiastes seems to have had the no-breakfast plan in mind when he wrote, "Woe unto thee, O land . . . when thy princes eat in the morning" (x. 16).

Sound though the no-breakfast plan may appear in principle, and invaluable though it undoubtedly has been to large numbers of people, it is yet, like most rules in dietetics, by no means a universal rule, and many people find that it does not suit them, especially such as suffer from flatulent dyspepsia. It should scarcely be necessary to mention, to anyone thinking of giving it a trial, that it should not be adopted too suddenly, as all *sudden* changes in diet are apt to produce disturbance at first ; nor should this, or any other system, be judged by immediate effects, but a fair trial extending over at least several days should be given to it.

There are a few other principles which should be borne in mind in determining the best times for taking food. The last meal of the day should be taken as long as possible before retiring to bed, two hours probably being the minimum desirable. The reasons for this are : (1) that the churning motion which the muscles give to the contents of the stomach in the process of digestion can only be carried out when the body is in a more or less vertical position ; hence going to bed with a full stomach is likely to leave the stomach still unemptied in the morning, the contents probably fermenting, causing a furred tongue and a nasty taste in the mouth ; (2) that

stomach and intestines appear to constitute no exception to the rule that rest is necessary and beneficial to all parts of the body. The latter point is a factor in determining the interval between meals; the stomach seems to become more vigorous and to be able to accumulate digestive fluid better if it is given a respite between finishing one meal and commencing the next. Many people take meals so close together that fresh food arrives in the stomach while the last meal is still there, half-digested; this will generally hinder the digestion of both meals.

To take more food immediately before severe muscular or mental work is evidently unsound, because the blood necessary for digestion will be withdrawn to muscle or brain, and thus may cause indigestion. Also to eat much when tired or exhausted is generally unsound, because the exhausted body may not have sufficient force left to cope with extra work in the form of digesting food; in such cases rest or sleep is the best restorative; "he dines who sleeps"; it is worth while remembering that a tired horse will often refuse food until it is rested.

The principles enumerated appear to be the most important ones to bear in mind when attempting to solve the problem of "when to eat." Equally enthusiastic advocates are to be found for one, two, three and four meals in the day, those favouring one or two meals being generally, but not always, non-flesh-eaters. Individuality seems to be the deciding factor; some do best on few meals, others on "little and often"; but here habit and custom play an important part. The accumulation of evidence, however, seems to indicate that the British as a whole take more meals

in the day than is good for them, and that nations who live on two, or at most three, meals a day enjoy on the whole better health than those who indulge in more than this number.

NOTE.—The inadvisability of taking food when under the influence of strong emotion is dealt with in Chapter XXIII., on "Mental Conditions and Physical Health."

CHAPTER XI

ABOUT DRINKING

THE human body is approximately three parts by weight water; under ordinary conditions an average person is said to lose through the lungs, skin, kidneys, etc., from $3\frac{1}{2}$ to 5 pints of water daily, which amount will therefore require to be replaced; in taking the necessary amount of liquid there are a few principles which need to be borne in mind.

It should scarcely be necessary to emphasise the fact that when the system needs liquid it needs water, and water is the only substance which can satisfy that need—*i.e.* whatever other substances, such as alcohol, tea, etc., there may be mixed with the water, water is the only one that can supply the system with the liquid it requires. It should also be pointed out that the $3\frac{1}{2}$ to 5 pints mentioned above includes not only liquid drink, but also the liquid contained in food; so that a person who takes a good deal of fruit, vegetables, and other foods containing or prepared with much water, may easily derive in this way all the liquid that he requires and not need to take any in the form of drink.

The $3\frac{1}{2}$ to 5 pints which physiological text-books state to be necessary is of course only an approximate generalisation, and varies with occupation, climate, and with individuals. A number of people, chiefly women, probably take too little liquid, but of

course the majority of people in this country err rather on the side of excess. Needless to say, instinct, if unperverted, would afford the best possible guide in this matter, but too many people destroy natural instinct and create in its place an unnatural, artificial craving which leads them into excess; thus the "dry," parched feeling at the back of the throat, generally interpreted as thirst, is often nothing more than irritation set up by the use of "fiery," strongly flavoured beverages, or even by the excessive use of salt or irritating condiments. Again, the craving for stimulation is only too often mistaken for thirst, and this craving, as everyone knows, is never more than *temporarily* satisfied by more stimulation, but grows continually more insistent and more difficult to satisfy. The terribly insidious way in which the craving for stimulation fastens its grip upon men is daily being so distressingly illustrated on all sides in "civilised" countries, as to make it almost superfluous to warn people against the danger. The habit of taking alcoholic drinks, not because the system is in need of liquid, but purely for a spurious sociability's sake, is perhaps the most outrageously ridiculous and suicidal of all the dietetic habits of the day. Why A should derive pleasure from seeing B drink what B's body does not want is difficult to understand; in any case there seems to be no reason in common-sense why B should gratify A's morbid taste for seeing other people do what they do not want to do, and what may do them harm.

The craving for flavoured drinks of every kind, both alcoholic and non-alcoholic, is of course to some extent purely a matter of habit; but in many cases

it may also in large part be traced to faulty nutrition, a craving being set up in the body owing to the food taken not being suited to all the needs of the organism. However that may be, it is a fact that has been observed over and over again by people who have "reformed" their diet and modelled it more or less on hygienic and common-sense principles, that the liking for fancy drinks, and for stimulation, largely or wholly disappears, and that water, or drinks most nearly approaching water, not only satisfy thirst better, but even please the palate better than most artificial beverages. Of course many people will not believe this; but the proof of the pudding is in the eating, and those who have eaten it know its merits better than those who have not.

Much is heard nowadays of the best times for drinking: some advocate drinking at meals, others only between meals, and so on. The underlying principles seem to be simple and clear: drinking at meals is apt to make one slur over mastication and fall into the barbarous habit of "washing down" food with copious draughts of liquid; needless to say water is not saliva, and can never replace saliva. Further, drinking at meals dilutes the gastric juice in the stomach and is apt thereby to impede digestion. On the other hand it may be that the food taken is so dry as to render digestion difficult without the addition of a little liquid; at most tables in this country, however, this is seldom the case, most dishes having ample liquid in them, frequently too much, as in the case of milk puddings, etc. Speaking generally, therefore, very little if any liquid is required at most meals; in fact people who take plenty of fruit and

vegetables generally find that they need very little drink at all during the whole day, there being sufficient water in their food. It should be remembered, however, that to take too large a bulk of watery fruit, vegetable, etc., at a meal produces the effect of diluting the gastric juice just as drinking at a meal would do.

It is of course not good to take *quickly* a long, cold drink when the body is heated, as this will chill the stomach and may cause colic and other unpleasantnesses; it is, in fact, not good for the stomach to put into it anything very cold at any time; it is better to drink slowly and let the liquid be warmed in the mouth to approximately the temperature of the body; this will abstract the same amount of heat from the body—*i.e.* will cool it an equal amount, without abusing that long-suffering organ the stomach. It is obviously an abuse of the stomach to subject it to heat and cold alternately, as is frequently done at a modern, "good" dinner, where soup and other hot foods (prefaced in America by iced water) are followed by an ice, and then by hot coffee, and so on.

The habit of drinking hot water seems to be a very sound and beneficial one. Taken at meals instead of a cold drink it *sometimes* helps digestion; taken half-an-hour or so before a meal it cleanses the stomach and prepares the glands for secreting their digestive juices; it is especially beneficial in the early morning before breakfast; taken last thing at night it also tends to keep the stomach clean and will often wonderfully clear the tongue and prevent there being a bad taste in the mouth in the morn-

ing ; it may also, by diluting the contents of the intestines, alleviate constipation if taken last thing at night.

Hot water of course also provides the system with heat ready made, and this probably accounts in some measure for its observed stimulating effect. An account is given of a party of travellers who journeyed across the cold parts of North America, and took amongst their scanty baggage a spirit lamp for heating water ; when they returned they were loud in their praises of hot water, which they said, in addition to warmth, gave them great strength and endurance. Japanese soldiers are said to think a great deal of hot water on the march, and other nations are also known who derive benefit from its use.

Cold water, if not taken in too large a quantity, has also very often a stimulating and healthy effect on the digestive organs. Just as a cold bath, by the " shock " it produces, calls up a reaction from the heart, producing increased circulation and warmth, so will cold water taken internally administer a gentle " shock " to the gastric glands of the stomach and stimulate their secretory powers. For this purpose it is a useful plan to take half-a-glass of cold water (no more) a few minutes before, and immediately after, a meal.

A warning should perhaps be entered against the theory sometimes heard that it is a good thing to take a great deal of liquid, the idea being that it flushes the system and carries away impurities. The plan may perhaps be useful under certain conditions, but it can scarcely recommend itself as a regular

practice ; to flood the system with unnecessary liquid is to produce a watery condition of the blood, to induce abnormal perspiration, to throw extra work on the kidneys, and, by increasing the volume of the blood, to raise the blood pressure and thus tax the heart.

CHAPTER XII

HOW MUCH TO EAT

"It may with truth be asserted that the greater part of mankind eat more than is necessary; and by being crammed and over-fed in infancy, we are deprived of that natural sensation which ought to tell us when we have enough."—HUFELAND

"Physicians and hygienists are very generally of opinion that a large proportion of the well-to-do people in this country eat more than is necessary, and this opinion is certainly borne out by figures for actual food consumption."—Prof. ATWATER

"Over-feeding is the prominent dietetic sin." — Prof. CHITTENDEN

"It is safe to say that all those whose station in life is above that of paupers, nowadays take more drink and food, or both, than they require to replace the matter used up by bodily or mental labour."—HEUBNER

"It may safely be affirmed in relation to this question of food in health, that the middle and upper classes eat quite too much."—Prof. KIRK

"One-fourth of what we eat keeps us, and the other three-fourths we keep at the peril of our lives."—ABERNETHY

THE statement only needs to be made, to be universally admitted as true, that there is an intimate relationship between the amount of food a man eats and his health and strength. If too small a quantity is taken, vitality and power will be lowered through want of building material and fuel, while too large a quantity will soon reduce vitality and power by overloading and clogging the system and absorb-

ing much of its available force in ridding itself of superfluous material.

It is a remarkable fact that it is only of recent years that what may be termed a common-sense method has been adopted in attempting to solve the question of the amount of food best for man. The method by which the generally accepted standard of food requirement—*i.e.* the standard found in the orthodox text-books—has been arrived at is open to several weighty objections; the method has been to observe the actual dietetic habits of large numbers of people living under various conditions of life, and to tabulate the results as the amounts of food necessary. The fundamental flaw in the method is apparent: for the fact that certain people actually consume certain quantities of food and drink per day affords no proof that such quantities are either necessary or even desirable; as well say that because people of a given community are in the habit of consuming a certain amount of wine or beer, or an after-dinner cigar, therefore this amount of stimulant or tobacco is one of the physiological needs of the body. It is patent to all that the vast bulk of men do not eat and drink certain amounts because they know from scientific study or from careful observation or experiment that such amounts give them a maximum of health and strength; on the contrary they are generally swayed in this matter by quite other considerations, the principal ones of which are probably local and national customs and habits, the conventions of society, and *the length of their purses*. As people, both individuals and nations, become more prosperous, they turn to more tasty, appetising and

expensive food and drink; the greater variety of foods and flavours accessible to those who have the means of purchasing them abnormally stimulates appetite and craving for food, and dietetic customs change accordingly, becoming as a rule more and more artificial and luxurious as time goes on. Such luxurious habits, and eating for pleasure's sake instead of to satisfy the physiological needs of the body, gradually pervert and suppress natural instincts, until eventually appetite and the so-called pangs of hunger cease to be safe guides to follow, a large proportion of people erring decidedly on the side of excess. Natural instinct having thus become to a large extent perverted or suppressed, it is necessary to study the matter scientifically in order to find out the quantity of food best for health and strength.

Investigations along this line have recently been made by Prof. Chittenden, and some of them are recorded in his now famous book, "The Nutrition of Man." Having arrived at the conclusion that the orthodox or text-book standard of food requirements had been obtained by working on a principle fundamentally unsound and unscientific, as briefly described above, he carried out some test experiments in order to ascertain what would be the effect of reducing the intake of food considerably below the orthodox standard. He points out that in the past a number of isolated cases have been observed by physiologists (Voit, Hirschfield, Klemperer, Siven and others), where good health and strength were maintained on considerably less food than the generally accepted standard called for. The case of Luigi Cornaro is notorious; being a dyspeptic wreck at 40, he re-

duced his food to 12 ounces a day and attained to splendid health and vigour, dying at the age of 98, some say 103. Other cases lived on amounts of food varying from one-fifth to a half of the orthodox standard; Horace Fletcher's diet comes to exactly one-third of this standard. So imbued, however, do both the medical and the lay public appear to have been with the idea that a large consumption of food is essential for a high level of health and strength, that these recorded instances seem to have been looked upon merely as curiosities or freaks, and there has been a complete failure to recognise their profound practical significance. In extenuation it may be said that most of the observations extended over a short time only, and no serious attempt seems to have been made to extend them over longer periods.

The following is a very brief epitome of Chittenden's experiments as recorded in "The Nutrition of Man." The first group of subjects consisted of professors and instructors in a university, engaged in both mental and physical work, though principally the former; before the experiment the subjects ate about as much as most people, and their food was gradually reduced in quantity during the experiment. Three typical cases are cited in detail. (1) A man of 47, weighing 143 lbs.; at first 18 lbs. weight were lost, which, being superfluous fat, the subject was glad to get rid of; weight then remained constant, and has done so for over three years. Improved health, greater freedom from minor ailments, and less susceptibility to fatigue were observed to result from the experiment; for the last nine months

the food taken was 34 per cent. of the Voit¹ standard. In this case, as well as in the others, perfect freedom of choice was allowed the subjects in the selection of food, and it was observed that as time went on there gradually resulted "a stronger liking for simple foods, with their more delicate flavour, accompanied by a diminished desire for the heavier animal foods." In this case, for three years after the conclusion of the experiment, the new habit of diet was so firmly established that all desire to go back to the old excessive diet had completely disappeared, the appetite being fully satisfied on the diminished quantity of food. (2) A man of 32, of strong physique and active habits; weight fell 13 lbs. during the first two and a half months, then remained fairly constant for the remaining five months; the amount of proteid taken was 32 per cent. of the Voit standard. As before, free scope was left to the appetite to select whatever food was preferred, and in this case there was gradually developed a tendency towards a vegetarian diet, very little flesh-food being taken during the last seven months of the experiment. (3) A man of 26, weighing 143 lbs.; for six months 41 per cent. of the Voit standard was taken, and for the next two months

¹ For the sake of simplicity, and in order to make fair comparisons, this and following amounts, after being corrected for body weight, have been expressed as percentages of the Voit, or orthodox, standard; for detailed figures see "The Nutrition of Man." The Voit standard is:

	ORDINARY WORK	HARD WORK
Proteid . . .	1820 grains	2240 grains
Fat . . .	865 "	2470 "
Carbohydrates . . .	770 "	695 "

35 per cent., health and strength being maintained throughout.

The second group of subjects consisted of eight university athletes, 22 to 27 years of age ; this class of subject was chosen because of the deep-rooted belief that a large consumption of food, especially of proteid, is essential for the production of great muscular force. At the commencement of the experiment they are described as all being in "training form" and in the "pink of condition," and "all large consumers of proteid food." The experiment lasted five months, during the last two months of which the proteid taken varied from 37 to 46 per cent., averaging say 42 per cent. of the Voit standard, or less than one-half of their previous diet. During the experiment every one of the eight gained strength by amounts varying from 16 to 85 per cent., the average for the whole eight being 35 per cent. increase ; the gain in strength was observed to be progressive each month. Diet was absolutely the only condition in their mode of living which was changed, everything else remaining exactly as before.

The third group of subjects consisted of thirteen men of the Hospital Corps of the United States Army, of different ages, nationalities, temperaments and degrees of intelligence ; they were accustomed to an active life and naturally had great liking for the pleasures of eating, so that the difficulties involved in the experiment were greater than in the preceding ones, as these men could hardly be expected to suffer much personal discomfort for the sake of physiological research ; it was evident, therefore, that these subjects would not take kindly to anything in the

nature of deprivation. Their ordinary army ration was very rich in proteid, beef being given three times a day, to a total of more than $1\frac{1}{2}$ lbs. For the six months of the experiment they were under military discipline, and were given gymnastic exercises in addition to their ordinary drills and duties. During the first three weeks, while the food was being gradually reduced, the men feared that they would lose strength on the diminished amount of food, but they very soon found that their fears were groundless and became contented with the changed order of things. The amount of proteid food was reduced to about one-third of what they had been accustomed to. The weights of the men remained much the same, some losing and some gaining a few pounds; one somewhat stout man, however, lost a good deal of his fat and was all the better for it. Tests showed that every man had increased in strength by amounts varying from 47 to 122 per cent., the average increase for all the men being 83 per cent. It must be pointed out that in this experiment the gymnastic exercises no doubt largely accounted for the increase in strength; but the value of the experiment lies in showing that the great increase in strength took place while the intake of food was considerably less than the ordinarily recognised standard.

In the case of the athletes it appeared to some of them that they suffered less from fatigue after their change in diet than before; with a view, therefore, to ascertain the effect of the reduced diet on powers of endurance, Professor Irving Fisher of Yale carried out an experiment on nine healthy students. The

proteid of their diet was reduced to 54 per cent., or roughly one-half, and the flesh-food to 14 per cent., or one-seventh, of what they had been in the habit of taking previously. No changes of any kind were made in their habits other than this one of diet. Tests proved that the average endurance of the nine students in each of the six tests imposed was increased from 34 to 145 per cent. ; the total endurance showing 73 per cent. increase. The only man whose endurance showed any decrease was "one whose case was exceptional in almost all respects. His reduction in quantity of food, except for a spurt at the end, was less than of most of the men ; his reduction in proteid, with the same exception, was the least of all. He stands out conspicuously as the one man whose endurance failed to improve." (His loss of strength and endurance appears to be an illustration of the folly of making changes in diet too suddenly.)

Referring to the connection between the amount of food consumed and the incidence of disease, Chittenden says, "I know of only one series of scientific observations that bears directly on this question." Dr Reid Hunt of Washington has studied recently the power of resistance to the poison acetonitrile of animals kept for some time upon a reduced proteid diet. "My experiments," says Dr Hunt, "showed in all cases that the resistance was much increased." In other words, the animals that had been fed on a low proteid ration were able to endure a much larger dose of the poison than corresponding animals on their customary diet ; "they resisted two to three times the ordinary fatal dose of acetonitrile." This general subject, however, is

obviously a very important one, and merits further experimental study under a diversity of conditions.

It has been possible here to give only the barest summary of Chittenden's experiments: those interested are strongly recommended to read the full account in "The Nutrition of Man." The conclusion to which all the experiments lead confirms and corroborates the fact already arrived at more or less from *à priori* reasoning—viz. that the great majority of civilised people consume considerably more food, and especially proteid or nitrogenous food, than is consistent with the best health; in fact, the trite saying that is nowadays on everybody's tongue, including the doctors', that most of us eat too much, may now be said to have been demonstrated and proved to be a scientific fact; further, Chittenden's researches go to show that from *one-half* to *one-third* of the orthodox standard of food requirement is the amount indicated as best; the significant fact will not be overlooked that Horace Fletcher, and others working along the lines with which his name is associated, have arrived at practically identically the same scale of food requirement as Chittenden has along his lines.

To recapitulate. It having been shown that the generally accepted standard of food requirements has been based, not on what men *ought* to eat, but on what they actually *do* eat, that standard can no longer be accepted as representing the true requirements of the organism for food, because the great majority of civilised people, swayed by the pleasures of the palate, the love of luxury, and by other causes, err on the side of excess in the food and drink they

consume. The principal reasons why such marked improvement in general health, strength, endurance, etc., should result from diminishing the intake of food, appear to be, firstly, because any excess of food over and above what is really necessary for the nutrition of the body is a direct tax on the forces of the body, and secondly, because, the system being clogged and overloaded with waste and poisonous products, there is a lessening of the powers of the organism to resist the invasion of disease germs ; in fact, the mere presence in the system of masses of undigested and putrefying food may of itself, without any external aid, be sufficient to set up disease.

Chittenden's researches and conclusions, though highly spoken of and widely accepted by large numbers of people, have come in for their share of criticism ; the gist of the criticisms seems to be to the effect that the experiments have not yet been carried out over sufficiently long periods of time to warrant unreserved acceptance of the conclusions to which they lead ; for, it is said, though the reduced intake of food may be beneficial at first, its continuance might ultimately be harmful. This of course is pure theory, and has no actually observed facts to support it. Most of Chittenden's experiments lasted for five to nine months, some for several years, and it is difficult to believe that the very marked improvements observed up to the end of these periods were purely illusory and destined to lead eventually to harm instead of good. While recognising that it is often a mistake to judge a thing to be ultimately beneficial because its *immediate* effects are (apparently) beneficial (as in the case of alcohol, morphia,

and other drugs) it seems to be straining the principle to extend it over many months or years. If the ultimate effect is destined to be bad instead of good, one would have thought that there would be at least *some* indication in *some* of the cases of the coming catastrophe. But no such indications have been recorded: on the contrary, nothing but benefit and improved health in every case have been observed to follow from the diminished intake of food.

An interesting confirmation on a large scale of the general truth of Chittenden's conclusions is afforded by the Japanese. Kintaro Oshima, in a work on Japanese investigations on the nutrition of man, shows that the bulk of the population of Japan, who live largely on vegetable foods, consume a total of 51 per cent., of this the digestible portion being 38 per cent. only, of the Voit standard, and that these people "are really healthier and stronger than people of the better classes, who live on a mixed diet, and the better physical condition of the former is commonly believed to be due to their diet."

The chief obstacle to the acceptance of the results of Chittenden's researches is undoubtedly the deep-rooted prejudice, amounting almost to a conviction, in the minds of so many people, that a large consumption of food is essential to the maintenance of a high level of health and strength. It is one of the ironies of life that this belief often receives apparent sanction from a superficial observation of facts; for it is observable that some of the healthiest and most robust of *young* men frequently have much larger appetites than less fortunate individuals. But care must be taken not to reverse cause and effect; for

although it *might* conceivably be that large consumption of food produces good health, yet, from what we now know, it is far more likely that it is only constitutional robustness that enables certain systems to dispose without much apparent difficulty of excessive amounts of nutriment; if people with less powerful digestive organs were to abuse the latter by imposing on them the amounts of food which stronger people consume they would rapidly come to grief with indigestion, etc. It is a significant fact that one so often hears of the breakdown or death in middle life of men who in their youth ate and drank to their hearts' content and never knew what indigestion meant; while on the other hand countless records show that the great majority of men who live to a good age are abstemious and small eaters.

Another obstacle to Chittenden's conclusions on the matter of food requirements being readily accepted and *put into practice* is, to put it bluntly, that most men are too fond of the pleasures of eating to forego (as they think) any part of those pleasures. "It is a hard and difficult task," says Cato, "to undertake to dispute with men's stomachs, which have no ears." But if Chittenden's experiments have shown anything they have shown this, that if the intake of food is reduced gradually the appetite will also gradually adjust itself to the new conditions, and will be perfectly and completely satisfied with the smaller amount of food. Not only this, but it is carefully noted that in practically every instance the sense of taste was so improved that, although free latitude was allowed the subjects in their choice of food, they preferred plain and simple articles of diet

to any others. An illustration is thus afforded of the principle that Nature treats men best when men treat Nature best. The reader will not fail also to observe the significance of the fact that, as the system becomes attuned to the new (and shall it not be said better and more natural?) level of nutrition, the palate instinctively prefers vegetarian foods and repudiates fleshmeats.

In the next chapter an attempt will be made to apply the facts learnt in this chapter to practical diet.

CHAPTER XIII

ABOUT WEIGHING FOOD

"Use a measure in eating, that thou mayest live long"

THOMAS COGAN

ALTHOUGH the mere suggestion of weighing a person's daily food is apt, when first mooted, to be treated with derision, a little dispassionate thought should be sufficient to show that the idea is not without justification. Men who have kept racehorses or polo ponies know the importance of carefully regulating by weight the food of their animals; if this is worth while for animals, why not for men? Further, the only way to derive full benefit from the facts set forth in the last chapter, regarding the amount of food best for men, is to pay some attention to the actual weights of food materials.

This is the more necessary because the average person has as a rule very vague ideas of food quantities. It must be remembered that the weights of many articles of diet as served up at table are very different from their weights in the raw, uncooked state; cereal foods, for instance, such as rice, macaroni, oatmeal, etc., absorb in cooking several times their own weight of water, and increase in bulk many hundred per cent. *Bulk by itself affords no criterion whatever of food value*; the only

way in which the real value of a dish as nutriment can be ascertained is by knowing the amount of material it contains in a dry or uncooked state. Such as can appreciate the importance of having an approximate idea of the value of the food they consume are recommended to have weighed portions of a few common foods cooked; most people are astonished when they have done this, at the erroneous idea they had previously entertained of the amount of nutriment contained in a given quantity of cooked foods. It is usually sufficient to carry out this experiment once or twice only, it being easy afterwards to judge by eye sufficiently nearly for all practical purposes the food value of a given quantity of food as served at table.

From what has been said in previous chapters it should scarcely be necessary to explain that no suggestion is made to supersede the natural instincts of the body by a pair of scales. There can be little doubt that, in the present state of knowledge on human nutrition, the natural appetite, *provided it is given a fair chance*, will afford a far more reliable indication of the true needs of the body for food than can be done by weights and measures. But as the natural instincts of most people have, through abuse, ceased to be reliable guides, it is desirable for a time to supplement them by mechanical aids, the latter being intended to be employed only until the natural instincts have been restored to their normal state.

The factors affecting the amount of food required by a given individual are: (1) body weight; the

greater the weight the more the food required, and *vice versa*; (2) occupation; the more active the occupation the more the food needed; (3) individuality; this is the factor which eludes formulæ and cannot be tabulated; the principal reason why different individuals require, *cæteris paribus*, different amounts of food, is probably because of the difference in their powers of digesting and extracting nutriment from food; the better the digestive power the less the food required, and *vice versa*.

It will be remembered that in Chapter III. it was seen that proteid is the ruling factor to consider in diet; it is further found in practice that if the diet is so regulated as to afford approximately the correct amount of proteid, the amounts of the other constituents will also (with one exception, to be mentioned later) be found to be generally about right. The usual practice, therefore, is to arrange the diet principally with reference to proteid.

Taking five-twelfths (a point midway between one-half and one-third) of the Voit standard as the amount indicated by Chittenden's researches as a fair average of the amount of food required by an ordinary individual under ordinary conditions of activity, the amounts of proteid suited to different body weights will be as in the following table. The weight should be that of the body in a normal condition—*i.e.* any excessive adipose tissue should be estimated and deducted.

TABLE OF PROTEID REQUIREMENT

Body	Food	Body	Food	Body	Food
Weight in Lbs.	Grains Proteid	Weight in Lbs.	Grains Proteid	Weight in Lbs.	Grains Proteid
110	580	135	710	160	845
115	610	140	740	165	870
120	635	145	770	170	900
125	660	150	790	175	930
130	690	155	820	180	950

An easy rule, sufficiently accurate for all practical purposes, is to multiply the body weight by five and a quarter.

Dr Haig gives the following rule:—multiply body weight by nine to obtain the number of grains required; this gives a result about two-thirds greater than the above.

In order to simplify reckoning the amounts of proteid in various foods, a table is given on page 245 showing the number of grains of proteid in one ounce of the principal food substances. It should be understood in this matter of reckoning food values that, for all ordinary purposes, no great accuracy is needed, but only a rough approximation. Even if accuracy were desirable, these tables alone would not be sufficient to ensure it; and this for two principal reasons: firstly, because different authorities give different analyses, owing to individual specimens of foods differing from one another; thus macaroni varies from 45 to 58, rice from 21 to 36, almonds from 90 to 106, and so on. The tables therefore represent averages, whereas what we eat are not averages but individual specimens; secondly, because it by no means follows, because a certain food

contains, say, 15 per cent. proteid, that everyone or anyone will be able to extract that full 15 per cent.; some foods are more difficult of digestion than others,¹ and also some foods can be more completely digested by some individuals than by other individuals.

In reckoning the proteid value of a given meal it is usually sufficient to calculate the amounts in the principal items of the meal; these items will generally be, flesh-foods (if taken), cheese, pulses or nuts, and cereals. The proteid in fruits and vegetables, except perhaps in the case of some dried fruits, is so small as scarcely to be worth taking into account.

As already said, if the amount of proteid is about right, the carbohydrate, or chief heat and force producing element, will also generally be found in practice to be approximately correct; the only exception to this is when too large a proportion of the total proteid is derived from foods containing high percentages of proteid—*i.e.* flesh-foods, eggs and cheese, and nuts and pulses. The rule should therefore be to take small amounts only, say an ounce or two, of these foods at a meal, the bulk of the meal being made up of cereal or other foods in which the carbohydrate element largely preponderates. It is an interesting fact that vegetarian races, such as the natives of India for instance, instinctively recognise the need for this rule, and eat such foods

¹ Meat possesses this advantage over vegetable foods, that it is usually more capable of *complete* absorption—*i.e.* there is, generally speaking, a smaller proportion of indigestible proteid in flesh-foods than there is in vegetable foods.

as pulse sparingly, making up the greater part of their diet with bread or rice.

The hydrocarbon or fat element of food is one on which it is impossible to give any definite rule, even if such were desirable ; from one to two ounces is generally supposed to be sufficient for most people, but individuals vary considerably in this respect ; more hydrocarbons of course are required in a cold climate than in a hot one. Fats and oils, being great heat and force producers, as far as they can be utilised by the system, are especially valuable for severe muscular exertion ; this fact, curiously enough, does not seem to be appreciated by most European athletes, who in general reduce their intake of fat when they "go into training" ; natives of India, on the other hand, know the value of hydrocarbons and take large quantities of "ghee" (butter) when performing arduous labour.

Nothing definite can be said relative to the amounts of mineral salts necessary for the human body. Scientists have been in the habit of lumping together *all* "salts" and saying that so much should be provided in the food ; but as there are more than a dozen different kinds of salts required by the body this can scarcely be called scientific. On page 247 is given a table showing the number of grains of each kind of salt in a pound of the principal food substances.¹ It will be observed that vegetables and fruits are the foods richest in salts, this being probably the reason why vegetables and fruits are such valuable articles of diet. The mistake should on no account be made of thinking that, being deficient in

¹ On this whole subject see Dr Lahmann's "Natural Hygiene," from data in which these figures have been calculated.

proteid, vegetables and fruits are not "nourishing," and therefore of little use for food ; salts are quite as necessary and as valuable as proteid, and although it would be difficult to live on vegetables and fruits *alone* (excluding dates, figs, etc., and nuts) it would be equally difficult to live *without* vegetables or fruits.

Vegetables and fruits are also useful on account of the fibrous matter which many of them contain and which, owing it is said to its indigestible nature, stimulates the intestines to activity and thus tends to prevent constipation.

In order to show how simple a matter it is to reckon food values, the following example is worked out. Suppose the weight is ten stones ; then, from the table, about 740 grains of proteid will be required per day ; if this is divided among three meals of equal size each meal will contain about 250 grains. A simple menu might be somewhat as follows :—

BREAKFAST

Porridge, $\frac{3}{4}$ oz. oatmeal @ 72	.	.	54
Milk, 5 oz. ($\frac{1}{4}$ pint) @ 13	.	.	65
Bread, 3 oz. @ 41	.	.	123
Sugar, butter, jam, as required, negligible			0
Total,			<u>242</u>

LUNCH

Macaroni cheese :—

Macaroni, $\frac{3}{4}$ oz. @ 58	.	.	44
Cheese, $\frac{1}{2}$ oz. @ 125	.	.	62
Potatoes, 4 oz. @ 9	.	.	36
Carry forward			<u>142</u>

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	Brought forward	142
Rice pudding :—		
Rice, $\frac{3}{4}$ oz. @ 36	. . .	27
Milk, 4 oz. @ 13	. . .	52
Biscuits, $\frac{3}{4}$ oz. @ 45	. . .	33
Other vegetables, butter, dessert fruit, etc., negligible	. . .	
	Total,	<u>254</u>

DINNER

Vegetable soup, negligible	. . .	0
Lentils, $\frac{3}{4}$ oz @ 113	. . .	85
Potatoes, 4 oz @ 9	. . .	36
Bread, 2 oz. at 41	. . .	82
Rice, $\frac{3}{4}$ oz. @ 36	. . .	27
Stewed prunes, 2 oz. @ 9	. . .	18
Other vegetables, butter, fresh fruit, etc		
	Total,	<u>248</u>

The following are a few practical hints which may prove useful. A cheap and serviceable weighing machine is the kind used for letters, the letter being placed on a plate and the weight read off on a graduated scale. About 4 cubic inches of bread go to 1 oz., an ounce of toast represents $1\frac{1}{2}$ oz. of bread, or more, according to the thickness of the piece toasted. Figs average 2, prunes 3, almonds 28, to the ounce of edible matter; Cheddar cheese averages $1\frac{1}{2}$ cubic inches to an ounce. As an idea already mentioned, the only satisfactory way to get of oatmeal, rice, macaroni, and other foods of this nature, is to have weighed portions cooked.

CHAPTER XIV

ABOUT COOKING

“God sent the food, but the Devil sent the cooks”

IT is not proposed to deal in this chapter with the whole art, or science, of cooking, but merely to call attention to one important principle which underlies all rational, scientific cookery, and which unfortunately is in these days much neglected.

The great importance to the human organism of an adequate supply of various “salts”—both for building purposes in bone, nerve, brain, etc., and for many other purposes—has already been pointed out; experiments have even shown that animals fed on food deprived of its salts die sooner than animals who are starved to death through getting no food at all. The way in which vegetables, however (whose chief value lies in their salts), are usually cooked in this country deprives them of a great part of their salts; for the most usual custom appears to be to boil vegetables in water, *then pour the water away*, and serve up the more or less dry and insipid residue; the result is that, vegetable salts being easily soluble in water, the greater portion of them is thrown down the sink, the residue served up being, as someone has put it, about as tasteless, and as valuable, as shavings would be. The same treatment is also often given to fruits, and other foods such as

rice, pulses, etc. "The essential salines," says Albert Broadbent, "that can be readily washed out of food are chiefly two—potash salts and alkaline phosphates. These are also the two that are found deficient, about 50 per cent., in the waxy form of degenerated tissue. This is the type most common in atrophied children, and in persons suffering from consumption and other wasting diseases, but it is not uncommon in the capillaries and small arteries of many who *seem* in health."

The best method of preserving the salts in vegetables and other foods is to use a double cooker, the materials to be cooked being placed in the inner pan and water in the outer; a very little water may be added, if necessary, or the foods may cook entirely in their own juices.¹ Another good plan is to cook the vegetables with as little water as necessary, in an ordinary closed saucepan, an asbestos plate being placed under the saucepan in order to prevent burning. Steaming is not quite as effective as cooking in a double cooker because some of the juices of the article steamed drip into the water and are lost. Vegetables cooked conservatively—*i.e.* so as to retain their juices—are found to possess a much richer flavour than when deprived of their juices by being cooked in the ordinary way.

An admirable plan for the kitchen is one suggested by Mr Eustace Miles,² of keeping a stock-pot into which potato peelings, carrot and turnip tops,

¹ A good form of Double-Pan Cooker can be obtained from the Eustace Miles Restaurant Company, 40 Chandos Street; 4s. 6d. and 5s. 6d.

² See "The New Cookery." 1s:

cabbage and lettuce leaves, and other odds and ends of vegetables which are usually thrown away, may be put, and allowed to gently simmer on the hob for many hours ; most of the salts will in this way be dissolved out and may be served up as soup ; such soup will be found very palatable, and is certainly of great value on account of its richness in salts. A similar stock-pot may be kept for fruit odds and ends. Those who require vegetarian recipes will find abundance of them in the books enumerated on page 253.

CHAPTER XV

ABOUT BREAD

A GOOD deal has been written and said for some years past as to the respective merits of wholemeal and ordinary white bread. Wholemeal flour is simply the *whole wheat grain* ground up; white, or so-called "refined," flour is obtained by removing the germ and most of the outer covering or husk of the wheat grain. Seconds flour contains some of the "coarser" products of the mill, and is therefore intermediate between wholemeal and white flour. Hovis bread is said to be made from white flour and the germ of wheat. The brown bread as made by most bakers is simply white flour mixed with bran; this is not the same as wholemeal bread, because white flour and bran are merely two out of about a dozen products of the mill—pollards, sharps, middlings, etc.

The great superiority of wholemeal over white flour is due to the salts it contains, the greater part of these salts being contained in the outer coverings and the germ of wheat, which are removed in the process of "refining"—and given to pigs and cattle. An analysis we have before us shows that whole wheat contains four times as much phosphoric acid, six times as much lime, six times as much soda, as white flour, while it also contains some sulphur and sulphuric acid, of which white flour has none, the

total amount of mineral salts in wheat being $4\frac{1}{4}$ times as much as in white flour.

These facts are significant in view of what is heard so much of nowadays—viz. the association of deficiency of phosphates and other salts with cases of brain fag, nervous collapse, rickets, etc.; an attempt is frequently made to supply these deficiencies in children by feeding them with preparations of malt, which are claimed to be rich in the very salts which are so carefully removed from their bread. It must be remembered that eating animal food cannot make good these deficiencies, because, although the salts form part of the animal's body, they are *mostly in the skeleton*, and very little in the muscles and other parts which are eaten by men.

A common result of living on white bread and on vegetables depleted by faulty cooking of their salts is what is known as "saline starvation," which may show itself, as Albert Broadbent says, in "dyspepsia, nervous irritability, pains in any and every part of the body, neuralgia, sciatica, lumbago, gravel, rheumatic fever, heart disease, and calculus . . . a page could easily be filled with a list of the protean maladies due to this condition. Others who suffer, while not inclined to the rheumatic diathesis, tend rather to the anæmic class of diseases, and suffer from pallor, weakness, inability to endure fatigue, etc. . . . I know many instances where this ailment [anæmia] has been cured by the use of whole wheat bread."

A number of authorities are of opinion that white bread, being deficient in phosphates, is largely to account for the decay of human teeth which is so ex-

ceedingly prevalent nowadays in civilised countries. Broadbent says, "For many years I have observed the beneficial results that have followed the use of good wholemeal bread; with it there is scarcely any toothache or neuralgia. . . . The teeth are made stronger and less tender owing to the proper supply of lime and phosphates."

Another valuable property of wholemeal is its effect on the bowels. White bread is extremely constipating, and much of the constipation from which English people suffer so notoriously is undoubtedly traceable to this cause. The author has frequently been told by natives of India that English flour almost invariably constipates them, and that such constipation disappears when they go back to their own "âta" or wholemeal flour. Broadbent says that with the use of good wholemeal bread "constipation is scarcely possible." It is an interesting fact that "Hippocrates particularly commended the use of unbolted wheatmeal bread 'for its salutary effect upon the bowels.' It was well understood by the ancients, that this bread was much more conducive to general health and vigour, and every way better adapted to nourish and sustain, than that made of fine flour. And accordingly their wrestlers and others who were trained for great bodily power, 'ate only the coarse wheaten bread, to preserve them in their strength of limbs.' The Spartans were famous for this kind of bread."¹

The superior sustaining power of whole wheatmeal over white flour is well known, even to-day; Indian soldiers have often told the writer that they cannot

¹ From Sylvester Graham's "Science of Human Life."

march on white flour anything like as well as on their own native wholemeal. The same fact has been constantly observed by food reformers in Europe. Majendie even found that though dogs live and thrive when fed on wholemeal flour alone, they die in a few weeks if fed on white flour. The use of refined flour in Europe is a comparatively modern innovation ; a few generations ago so-called coarse, black or brown bread was the bread in common use ; and this bread still forms the staple diet of a large proportion of the peasant population of many parts of Europe. Many and various are the beneficial effects which have been observed to result from the use of wholemeal bread. Sylvester Graham writes of a very interesting case : he relates that during the war between England and France at the close of the eighteenth century the supplies of wheat became so short that Parliament ordered unbolted wheat to be given to the soldiers, so as to make it go as far as possible. The result was that at first the soldiers were very disgusted, and threw their loaves at the baker as he passed, "and accompanied them with a volley of curses." "The result of the experiment was," however, "that the health of the soldiers improved so much and so manifestly in the course of a few months, that it became a matter of common remark among themselves, and of observation and surprise among the officers and physicians of the army. These gentlemen at length came out with confidence and zeal on the subject and publicly declared that the soldiers were never before so healthy and robust, and that disease of almost every kind had almost entirely disappeared from the army." The papers were filled with praises of the

bread, and many took up its use with great benefit; but when cheap flour began to come in from America, the unbolted, or wholemeal, flour was gradually left off, and people soon forgot all about it.

A great deal more could be said about wholemeal, but it is thought that the above few facts should be sufficient to show that flour made from the *whole wheat grain*, as provided by nature and untampered with by man, possesses striking advantages over the so-called refined flour in common use.¹ It may perhaps also be mentioned that, when once accustomed to it, most people find wholemeal bread more palatable than white bread.

Good wholemeal, chiefly owing to the efforts of food reformers, can now be obtained in most places without difficulty; some firms that can supply it are mentioned on page 257. Care should be taken that it is finely ground, otherwise the coarse particles are apt to prove indigestible and irritating to sensitive digestions.

¹ Dr Haig objects to wholemeal on the score of the xanthins it contains; the amount, however, is so small as to render it difficult to believe that any harm it might do would not be far preferable to the evils known to be attendant on the use of white flour;

CHAPTER XVI

THE PROPERTIES OF FOODS

THE subject of diet having, until recent years, received but scant attention from the medical profession, comparatively little is known by European science of the dietetic properties of food substances. Doctors have hitherto looked to drugs rather than to food substances to correct irregularities in the human system, hence the many valuable properties latent in even the commoner articles of food, especially vegetables and fruits, are all but unknown to the average medical practitioner. The rapidly changing attitude of medical men towards matters of diet, however, will probably lead in the near future to a great development in our knowledge of food properties.

One of the most important ways in which one food differs from another is in the amount and nature of the salts it contains (see tables on page 247); this applies especially to vegetables and fruits, the salts so abundantly contained in which are of great value, not only for building purposes, but also for the whole class of functions generally described, somewhat vaguely, as those of purifying and enriching the blood. In England to-day potatoes and cabbage (both generally badly cooked) form the vast bulk of the vegetables in common use, other kinds being

almost entirely neglected, the very names of many being scarcely known in many houses. The tables on page 247 reveal the fact that such herbs as the common stinging-nettle, dandelion, spinach, and others, are singularly rich in salts of various kinds, and although these vegetables are nowadays rarely met with at an English board, it is an interesting fact that the ancients, as well as modern so-called "quacks," of whom a few (chiefly old women) are still to be found in country places, make great use, amongst others, of the herbs mentioned, both for dietetic and for medicinal purposes.

When it is remembered that the animal organism cannot assimilate matter direct from the mineral kingdom, but only after it has been transformed into vegetable matter—*i.e. that all crude mineral matter is foreign or poisonous to the human organism*, it appears not improbable that the future will see medical science discarding to a large extent the crude mineral drugs which it employs to-day, and relying more on herbs and vegetable products for the supply of the salts it needs. The following are just a very few of the best-ascertained properties of some of the commoner foods, together with some hints which may prove useful to the practical food reformer.

The great value of the salts found in whole wheat flour, and absent from white flour, has already been pointed out. Rice and macaroni (which is made from partially cooked wheat) are in this respect similar to wheat flour—*i.e. the more "refined" and expensive they are, the less is their value as food, owing to their salts having been "refined" away.*

Thus the effect of polishing rice is shown by the following figures:—

	PROTEID	FAT	SALTS
Undressed rice. . . .	11.0	7.2	5.2
Ordinary or polished rice .	7.4	0.3	0.4

It is said that the Japanese, Burmese, and other nations who subsist principally upon rice, use the grain in its natural, unpolished state. The following is a comparison between two varieties of Neapolitan macaroni:—

	PER LB.	FAT	SALTS
A.	1.6d.	2½	2½
B.	1.7d.	1	1

Potatoes are better cooked in their skins than peeled, because most of the valuable potash salts are near the skin; thus, when boiled in their skins they contain 37 grs. potash per lb., while when peeled and boiled they contain only 21 grs. per lb.

The following are laxatives, to extents varying with different individuals:—Wholemeal; most fruits, especially prunes, figs, plums and strawberries; green vegetables when conservatively cooked; nuts. White bread and milk are constipating.

Porridge does not agree with many people owing to a substance it contains called avenin, which has an irritating or so-called “heating” effect on the intestines. Sugar taken with porridge, pastry, fruits, and other foods sometimes causes dyspepsia by setting up fermentation and causing acidity.

Porridge and other starchy foods, such as puddings,

should not be taken in a sloppy condition, as in this state they are very liable to escape the insalivation which they of all foods most require ; it is a good plan to take such foods with dry breadcrumbs, toast, or biscuit.

Toast is generally more easily digested than bread ; crust is more digestible, and more nutritious, weight for weight, than crumb ; biscuits are generally more easily digested than either bread or toast.

Cheese, though generally difficult of digestion when raw, is easily digested when cooked.

Nuts are usually only indigestible when not properly masticated. It is a good plan to pass them through a nut mill ; pulses may also, after being cooked, be treated in this way.

Much valuable information on the dietetic properties of fruits and vegetables is to be found in Albert Broadbent's "Fruits, Nuts, and Vegetables" (see page 252).

CHAPTER XVII

CONSTIPATION AND FLATULENCE

THE vital importance to health of the bowels being in a good state is too well known to need emphasis here. If putrefying matter is retained for any length of time in the intestines, the toxins or poisons so formed are liable to be absorbed into the blood, where their presence may cause, at the very least, lassitude, depression or headache. The importance to the organism of ridding itself of waste matter is so well recognised by nature that, if the intestines do not do their work properly, the lungs, kidneys, and skin are called in to help ; hence constipation frequently causes dark, strong-smelling urine, foul breath, clogged and sallow skin, and even an objectionable smell about the person.

The British as a nation are notoriously constipated ; doctors will tell one that three out of four *ordinary* people are *habitually constipated* ; even athletes, who adopt diets recommended by medical men, suffer from this complaint and are constantly applying to physicians for relief. A trained nurse recently told the writer that in the big hospitals about one-third of the patients receive a powerful aperient every twenty-four hours, and the remainder at less frequent intervals ; until she came to nurse a vegetarian patient she had never known a patient lie in bed for a fortnight without needing an aperient.

It must be understood that to be constipated simply means that there is retention of matter in the colon, or large bowel, which should have been expelled; the fact that there is a regular motion of the bowels every twenty-four hours affords no criterion whatever that constipation is not present. A medical writer says, "The worst cases of costiveness that we ever saw were those in which daily movements of the bowels occurred." Dr Turner of Washington found in 284 cases of autopsy, on patients who had died from almost all known diseases of our climate, that 256 of them had colons filled with hardened fæcal matter encrusted on the walls and into the folds of the colon; 28 only, or 10 per cent., were in a healthy state and free from hardened, adhering matter. The adhering matter was "in many places dry and hard as slate," and "was evidently the result of years of accumulation." In such cases the colon would frequently be distended to double its normal size, and there would be a small hole about "the size of one's little finger" through the centre, through which the fæcal matter passed, forced by the pressure behind, as the pieces of leather are forced out of a shoemaker's punch. And yet, "almost universally, as far as could be learned, these last cases spoken of had regular evacuations of the bowels each day." There is reason to believe that the state of Dr Turner's patients is by no means exceptional, but represents fairly well the state of the average Britisher or American of to-day.

The remedies for constipation may be classed under four heads: aperients: enemas: diet: exercise: the first two are of the nature of *cures*, the last two seek

to *prevent*. Of aperients it may be said that their stimulating action on the intestines is due principally to the violent effort of nature to get rid of the substances which they contain, and which are really *poisons* to the system; the chief objections to their use are that, like all stimulants, their action is followed by a corresponding depression, which in turn paves the way for a recurrence of constipation—*i.e.* they tend to perpetuate the evil which they temporarily alleviate; also, like all stimulants, their continued use gradually inures the system to them so that more and more is required to produce the desired effect. Enemas are probably less harmful than aperients, but they are open to the objection that they carry away, in addition to fæces, the valuable secretions of the intestines; further, continued use of the enema tends to weaken the natural powers of the intestine; hence many people, once they have taken to them, find that they cannot leave them off but are obliged to take them regularly once or twice a week.

Careful attention to diet will in most cases, *by removing the cause*, prevent constipation. The following are the principal points to bear in mind in preventing constipation dietetically:—(1) Eating more than is necessary obviously tends to overload the intestines and so cause constipation. (2) Inefficient mastication and insalivation of food tends to constipate by loading the digestive tract with food that cannot be digested. (3) The experience of vegetarians all over the world has shown that, speaking generally, a vegetarian diet is far less constipating than a flesh diet. Further, “fæces re-

sulting from highly nitrogenous food [such as flesh meat] are much more offensive and therefore more poisonous, than those which constitute the effete matter of a more natural and therefore simpler diet" (Dr Robert Bell). (4) The value of wholemeal as a preventive of constipation has already been referred to; it cannot be praised too highly. There can be little doubt that the enormously prevalent constipation of English people to-day is largely attributable to the use of white flour. (5) Vegetables cooked *conservatively* (see Chapter XIV.) are often found to be gently laxative, although some of them are frequently constipating when cooked in the ordinary way and deprived of their juices. (6) Milk is notoriously constipating, and forms very large fæces. (7) As mentioned in the last chapter, most fruits are laxative, especially figs, prunes, plums and strawberries; nuts and oatmeal are laxative with some people. (8) A glass of hot water night and morning is sometimes beneficial in cases of constipation. .

Constipation may often be relieved by mechanical means, by which is meant physical exercise such as riding on horseback, running, etc., and also massage of all kinds. Much good may be done by thoroughly kneading the abdomen, remembering always to work *up* the right side, across the body, and *down* the left side, this being the direction of peristalsis in the large intestine. The abdomen may be massaged internally by breathing deeply, and forcing the diaphragm alternately up and down, and also by moving the body or legs in such ways as to bring pressure or tension to bear on the intestines

—*e.g.* by lying on the back and raising the legs to a vertical position, either together or alternately; standing on one leg, preserving the balance by leaning against the wall with one hand, and swinging the other leg round in circles: bending over to touch the toes: bending the body in all directions, and twisting it from the waist: and so on.

The importance of habit in obtaining regular motions of the bowels must not be overlooked. The body is very much a creature of habit and may to a great extent be made to function regularly and automatically if a certain hour of the day is fixed upon and definitely adhered to, and sufficient time given.

The fact that women are generally more constipated than men is probably to no small extent due to the modern European habit of constricting the waist, the waist being drawn in exactly where the transverse colon crosses the body, thus buckling or bending it, in addition, of course, to *forcing almost every organ in the body*, to a greater or lesser extent, *out of its proper place*. The somewhat ridiculous idea that distorting the human figure lends to it grace, is contradicted by the races of India, Egypt, etc., whose women are incomparably more graceful than the wasp-waisted, high-heeled women of "civilised" Europe.

One word more on this matter. The human animal is constructed to defecate squatting on his heels, not in a sitting position; to attempt to defecate whilst sitting down has been compared to trying to force moist clay through a hose with a kink in it. The force necessary to get past the kink makes defecation difficult, and may lead to strain, piles, etc.

CONSTIPATION AND FLATULENCE 163

It is an interesting fact that the teeming millions of India, and, we believe, of many other countries as well, employ the squatting posture.

FLATULENCE

Flatulence is caused by gas, arising from the fermentation or putrefaction of food in the intestines—*i.e.* it is a form of indigestion. Some of the best-known causes are: (1) Rapid eating—*i.e.* improper mouth treatment of food; see Chapter IX., On Mastication. (2) Eating too soon after severe physical or mental exertion, when the system is too tired to cope with digestive work. (3) Bad combinations of foods, which vary with individuals—*e.g.* vegetables and fruits do not generally go well together. (4) Particular foods, which vary with individuals; common offenders are cabbage, turnips, cauliflower, some nuts, pulses, etc. Some foods which are offenders when improperly cooked are innocuous when conservatively cooked. (5) Going too long without food; those who suffer in this way generally do best on many small meals, rather than on a few large ones. (6) Fruit, with some dyspeptics. (7) Over-eating in early youth, resulting in distension of the intestines. (8) A chill on the abdomen; a strip of flannel round the abdomen (called a cholera belt in the East) will often afford relief. (9) Deficiency of proteid.

Temporary relief may sometimes be obtained by standing erect, breathing deeply, and bending down to touch the toes.

CHAPTER XVIII

SIMPLICITY IN DIET

"Simplicity and common-sense are the essential factors in the building of a healthy body."—ALBERT BROADBENT

"Simplicity is the corner-stone of good digestion."—KELLOGG

"Nature is frugal and her wants are few"

"Many dishes, many diseases: . . . Be not startled by the multitude of diseases; count the cooks."—SENECA

ALTHOUGH the diet of many food reformers and vegetarians is a very plain and simple one, it is quite a mistaken idea to suppose that such a diet is necessarily, *to a vegetarian*, monotonous or insipid, or involves self-denial, asceticism, or loss of gastronomic enjoyment; as a matter of fact the vegetarian can, if he chooses, have a very varied menu, although in flesh-eating countries such as England many of the most wholesome and nutritious vegetarian foods are scarcely known. Thus there are several varieties of cereals, several of pulses, and an almost unlimited variety of nuts, fruits and vegetables, while in addition there are now on the market, for those who care for them, any number of foods artificially prepared from cereals, nuts, and other vegetable sources, which many find at once wholesome and palatable. It must be understood, however, that there is such a thing as a vegetarian palate; most flesh foods (especially when taken with

mustard, pepper, and other condiments) have a strong flavour which tends to deaden the palate to the more subtle and delicate flavours of milder foods, and it is a common experience with people who discard, wholly or in part, the use of flesh foods, that the palate soon becomes much more sensitive and more able to appreciate the flavours of vegetarian foods. Hence so many vegetarians live on simple and little varied dietaries, not because they must, but because they prefer it. There is in diet, as in so many other things in this world, a point beyond which increased complexity and variety, instead of augmenting enjoyment, tend eventually to lessen it; and it is very easy to overstep this point. Sir William Roberts has well said, "The palate is the dietetic conscience."

Furthermore, it is an undoubted fact that, as Kellogg says, "simplicity is the corner-stone of good digestion." A large proportion of cases of indigestion can be traced, not so much to the use of any particular food or foods, but to the combination of a number of different kinds of food at the same meal. Those who content themselves with a well-selected dietary of a few courses only at each meal will seldom suffer from indigestion; but to accept this principle is one thing, to carry it out is another. The celebrated physician Thomas Cogan has expressed the matter quaintly and well; he says: "But the greatest occasion why men passe the measure in eating, is varietie of meats at one meale. Which fault is most common amongst us in England by reason of plentie (as I think) that they which be of abilitie, are served with sundry sortes of meate at one meale. Yea the

more we would welcome our friends the more dishes we prepare. And when we are well satisfied with one dish or two, then come other more delicate, and procureth us by that meanes, to eate more than nature doth require. Thus varietie bringeth us to excess, and sometimes to surfet also. But Physicke teacheth us to faede moderately upon one kind of meate only at one meale, or leastwise not upon many of contrarie natures. . . . This disease (I mean surfet) is verie common : for common is that saying and most true ; That more die of surfet than by the sword. And as Georgius Pictorious saith, ‘all surfet is ill, but of bread worst of all.’”

CHAPTER XIX

CHANGES IN DIET, ETC.

THE desirability of not making changes in diet too suddenly has already been emphasised ; it is especially important to bear this principle in mind when effecting a change from a flesh to a fleshless *régime*. The principal reasons for this are : (1) That the digestive organs, like other elements in man's constitution, are very much creatures of habit, and are apt at first to resent changes ; they require time to adapt themselves to new conditions. (2) Flesh-foods being stimulating, to leave them off suddenly is likely to set up a strong reactionary depression, often with unpleasant consequences ; it is much the same as suddenly leaving off alcoholic stimulants. (3) Meat being digested in the stomach, and cereals in the intestines, meat-eaters, through not exercising the intestinal digestion, as a rule have small power of digesting cereal and other vegetarian foods ; hence a too rapid change from a flesh to a non-flesh diet is apt to bring about a breakdown of intestinal digestion ; this is the explanation of the so-called "starch-indigestion" which is so common among both meat-eaters and vegetarians. A large proportion of the failures amongst people who have changed from a flesh to a vegetable diet can be attributed to this cause ; many people, in fact, have so weakened their starch-digesting powers by years of flesh-eating that,

though they wish to become vegetarian, they find that they cannot digest the diet and are obliged to return to the flesh-pots. (4) According to Dr Haig's theories, to lessen the amount of meat eaten, lessens the acidity of the blood, which is at once a signal for a rush into the blood of the xanthins accumulated in the system during the flesh-eating days; this excess of xanthin in the circulation (collæmia) causes lassitude, depression, headache, or a host of other unpleasant symptoms (see Chapter VII.). Haig says that it may take a year or more to clear the system of accumulated xanthins; he says, "Those whose bodies are full of urates, from years of flesh-eating and tea-drinking, are likely to get pale at first on the new diet as it will bring a large quantity of uric acid into the blood on its way to elimination, but this is merely the evil of the old diet becoming apparent." The process has been compared to cleansing a stagnant pond by letting into it a stream of pure water, the first effect of which is to make the pond fouler than before, owing to the deposits of mud being brought into evidence by the incoming stream. For all these reasons would-be food reformers will do well to make important changes in diet cautiously and gradually. Those who wish to become non-flesh-eaters are recommended to leave off flesh-foods very gradually, spending at least a month or two on the process; it is a good plan to leave off the heavier kinds of meat first, keeping to fish; then leave off fish, keeping to eggs for some time; finally (if desired) eggs may be reduced or left off altogether.

In modern England, owing to the colossal ignor-

ance of ordinary people on all matters connected with diet, it is very desirable, if one intends to model one's dietary on more or less scientific and correct lines, to have at least an *elementary* acquaintance with the comparative composition of the different classes of foods (see Chapter IV.), and it is also desirable to have a rough idea of food quantities (Chapter XIII.). Anyone who has spent a few hours in grasping the essentials of food composition will never regret the time so spent. If people could be induced to devote to *rational* thought and reading about the food they daily consume one hundredth part of the time they do not grudge to clothes, for instance, they would probably lead healthier and happier lives.

In Britain, of course, a vegetarian sometimes experiences when travelling a little difficulty in getting food that he considers wholesome; a good meal, however, can at a pinch be made of bread (preferably brown), with whatever minor things there may be available; if notice of an hour or two can be given, macaroni or macaroni cheese can be prepared and will form a good basis for a meal; Welsh rarebit (toasted cheese) is also an excellent stand-by, as it can be made in a few minutes. On board ship no difficulty need be feared, as the purser is always obliging and will provide one with almost anything one may desire, if a little notice is given.

It is of course idle to deny that a food reformer nowadays has at times to put up with a certain amount of discomfort, and to endure being thought a nuisance and a faddist by other people; but such is always the lot of pioneers of any new movement;

no doubt in a cannibal country the first people who refused to partake of "long pig" would be looked upon by the rest as fastidious nuisances. All movements towards progress demand self-sacrifice on the part of individuals ; hence, most people preferring to see others sacrifice themselves first, the growth of new movements and the adoption of new ideas, even when perfectly sound and a distinct advance on the current conventions of the day, are generally slow.

The general question of how far one is justified in inconveniencing others, not so much for one's own personal comfort or health, but for the ultimate benefit of mankind, is of course an ethical problem which every individual, in the circumstances in which he is placed, must solve for himself.

CHAPTER XX

ALCOHOL

THE whole question of alcohol is such a large one, and still so controversial, that it will only be possible here to briefly outline some of the leading features of the subject.

It would be superfluous to offer proof that excess of alcohol is in the highest degree injurious to man, mentally, morally and physically ; Government blue-books, statistics of all kinds, lunacy reports, and the records of physicians, surgeons and the law courts afford only too eloquent testimony to the terrible ravages of what has well earned the title of one of the curses of civilisation. Those who think that the evils attributed to the excessive use of alcohol are exaggerated, have only to read for themselves the figures and facts compiled, not by teetotal enthusiasts, but by Government officials and men of science ; there are few to whom these figures, when seen for the first time, will not come as a revelation ; the destruction, devastation and degradation directly or indirectly attributable to the use of strong drink is such that one can scarcely blame the exaggerations of temperance reformers—if they are exaggerations.

The question now naturally arises : what exactly constitutes *excess* of alcohol ? What is the point (if there is such a point) at which alcohol ceases to be beneficial, or at least innocuous, and becomes harm-

ful? The curious part about this matter is, that the more the action of alcohol on the human system is studied by men of science, the smaller becomes the amount which is said to be innocuous; thus not long ago it was usual to hear medical men say that about 2 ounces a day was the limit which an ordinary man could take without injury; lately, however, the amount has been reduced, and from 1 to $1\frac{1}{4}$ ounces has been pronounced as harmless, though even the *regular* use of this quantity is not commended.

The question whether alcohol is a food or not has long been a bone of contention, and learned and able men have ranged themselves on either side; the matter being still apparently not definitely decided, it is not for laymen to pronounce judgment; it may, however, be permissible to draw attention to a few striking points in the matter under consideration.

It is of course scarcely necessary to point out that, although an alcoholic drink may satisfy the needs of the body for liquid, it is the water in the drink that does so, and not the alcohol; alcohol, though similar to water in appearance, is physically and chemically a totally different and distinct substance, and is therefore no substitute for water.

If alcohol is a food, then there are certain important respects in which it differs from all other known foods; thus, unlike other foods, the same quantity does not continue to produce the same effect; but *more and more* is required to produce a given effect; the use of other foods does not create a desire for ever increasing amounts, as does the use of alcohol; sudden abstinence from other foods does not derange the nervous system, as sudden stoppage of alcohol fre-

quently does ; other foods are oxidised slowly and are stored in the body, whereas alcohol is oxidised rapidly and is not stored in the body ; although people are advised to take food, they are advised never to take alcohol, into an empty stomach ; children are advised to take plentifully of food but always are advised to abstain from alcohol ; the use of foods is not followed by a reaction as is the use of alcohol ; and so on. But perhaps the most significant way in which alcohol differs from other foods is in the amount of it which is claimed to be food ; for, to the best of our knowledge, *there is no other known food of which a small amount (and that a somewhat arbitrarily fixed amount which is constantly being revised) is said to be beneficial, and of which more than this amount is a virulent and death-dealing poison.*

But the question whether alcohol is a food or not can safely be left for final solution to experts ; it is not one of much practical moment, for the food value *of the small amount said to be harmless* is so infinitesimal as to form an inappreciable part of the daily ration ; thus Sir Michael Foster says that "there is no more nourishment in a gallon of beer than is found in a lump of sugar," while Baron Liebig says, "We can prove with mathematical certainty that as much meal as can lie on the point of a table knife is more nutritious than 9 quarts of the best Bavarian beer."

It will perhaps be instructive to examine some of the reactions of alcohol ; space does not permit more than a mere sketch of some of the principal ones. The hardening property which alcohol possesses is well known ; it is for this reason employed in preserving animal and vegetable specimens ; remember-

ing that the digestive process aims at liquefying all food, it is clear that the presence of alcohol will materially hinder the process; alcohol also seriously lessens the solubility of many substances—*e.g.* sugar—a fact which again will hinder digestion; the dissolving power of the gastric juice has also been shown to be lessened by alcohol; osmosis (the passage of liquids through a membrane, which plays an important part in the assimilation of food) is considerably obstructed by alcohol. One part of alcohol in 1000 parts of water has a poisonous effect on medusæ (freshwater jellyfish); 1 part of alcohol in 1000 of water kills, or nearly kills, cress seeds; 1 part in 10,000 of water retards the growth of plants; the growth of onions, potatoes and wheat is prejudicially affected by alcohol, proportionately to the strength of the solution; retarded growth and development are brought about by the action of alcohol on water fleas, frog spawn, hens' eggs, tadpoles, infusoria, germinating seeds, tape-worms, leeches, various kinds of fish, birds, mammals, and many other forms of life. Alcohol shrivels up, and finally destroys, the red corpuscles, of the blood, whose function it is to carry oxygen, and lessens the activity of the white corpuscles, whose function is to remove waste matter and fight disease germs; it abnormally increases the beats of the heart, and also, as the classic experiments on Alexis St Martin showed, sets up morbid conditions in the mucus membrane of the stomach.

These facts show that alcohol acts as a poison on almost all forms of life; as Dr Sims Woodhead says, "The direct poisonous action of alcohol upon protoplasm of all kinds is very marked"; in certain

quantities at least it has of course long been recognised as a poison; Dr Ewart, Senior Physician at St George's Hospital, says that "alcohol has long stood at the head of the list of poisonous drugs to which the public has unlimited access."

In all these investigations it has been found that the poisonous effects of alcohol are proportional to the amount of the drug; there has been nothing to show that, up to a certain point, the substance acts as a food, or is beneficial in any way, and is a poison only beyond that point; the results show that it is a poison from start to finish. It may well be, of course, that it is possible to administer doses so small that no injurious effects can be observed; the same may be said of many other substances, even the most virulent poisons. In the absence of direct evidence to the contrary, therefore, one cannot help being forced to the conclusion that the *very small* amount of alcohol claimed by some medical men and others to be innocuous is only so in so far as it is difficult to detect any injurious effects it may produce, and the fact that the maximum non-injurious allowance is continually being reduced looks very much as though continued observation and study enables injurious effects, which previously escaped notice, to be detected. It must be remembered that it is an exceedingly difficult matter to detect the effects of very small doses of a drug, and experience has shown that the use of an injurious substance, in quantities too small to produce any *observable* effect at the time, may, if continued long enough, eventually bring about serious and lasting injury.

But the most significant and interesting effect of alcohol on the human system is undoubtedly its subjective effect—*i.e.* its action on the feelings of the person who takes it, acting through the nervous centres. Alcohol is continually resorted to by many people to remove half the ills of life ; thus some are confident that it improves digestion, others say that it braces them up, makes them feel more capable of physical or mental exertion, soothes them when worried, warms them when cold, cools them when heated, restores them when fatigued, makes them better tempered and more sociable, and so on. If these feelings of increased power, etc., are really true indications of actual fact, then the claims of alcohol must be considered with respect ; but the merest tyro in scientific research knows that subjective sensations are often far from being reliable indications of fact, and must therefore be put to some kind of instrumental test. Innumerable tests of this nature have proved in the clearest possible manner, by actual instrumental measurements, that both physical and mental powers are materially decreased by alcohol. The feeling of increased power, etc., is a purely subjective or imaginative one. Dr Lauder Brunton, referring to Krapelin's experiments, says, "The influence of alcohol on psychic processes is curious, for while it renders them much slower, the individual under its influence believes them to be much quicker than usual." In publishing the results of these experiments Dr Brunton shows that alcohol made the subjects take longer to see a given object, longer to discriminate between two objects, and longer to communicate the result when they had

distinguished between them. Dr J. J. Ridge also found that small quantities of alcohol, even as much as there is in half-a-pint of ale, or a wineglass of sherry, prejudicially affected steadiness of hand and co-ordination of the muscles, sharpness of sight, accuracy of judgment, rapidity of thought, rapidity of muscular action, and power of self-control. Alcohol increased errors in the sense of touch 65 per cent., decreased sensibility of weight 28 per cent., shortened length of vision 9 per cent., and increased errors in judgment and decision 14·4 per cent. Many other authorities have confirmed these results. In Sweden alcohol was found to prejudicially affect the accuracy of aim of soldiers; in this experiment all the men after their drink declared that they felt more capable of shooting well—but the targets told a different tale.

It is of the greatest interest and significance to observe that in practically all the experiments the subjects felt that the alcohol did them good, but actual measurements showed that the reverse was the case. As Dr Ridge remarks, "persons under the influence of alcohol are not capable of forming a correct estimate of their powers, or of the influence of the alcohol upon them"; this of course has long been known where comparatively large quantities have been taken, but now it has been shown to be true also where small quantities are concerned, the difference being one of degree only.

The deceptive nature of the subjective sensations produced by alcohol explains numerous phenomena; thus with regard to the feeling experienced by many that alcohol aids digestion, Dr James Muir Howie

(late President of The Royal Medical Society, Edinburgh) says, "Many an epicure is led to believe that alcohol materially aids his digestion, when in reality it merely exerts a narcotic influence on the gastric nerves, and thus prevents the experience of dyspeptic inconvenience. The dyspepsia is not removed, it is simply disguised." Similarly with regard to fatigue, of which Dr Destree says, "The inevitable conclusions from the experiments are, that alcohol is a deceptive means of dulling the sense of fatigue, but its action is temporary and in the end injurious, the paralysing effects on the nervous system increasing rapidly and with such force that any momentary good effect cannot counter-balance them." And again with regard to heat and cold (many people taking alcohol at one time to "keep out the cold" and at another to make them feel the heat less), it has been shown conclusively that, despite the *sensation* of warmth, alcohol *lowers* the temperature of the body, the sensation being due to dilation of blood vessels of the skin and stomach, which warms the surface by bringing blood to it, but causes a loss of heat by the excessive radiation so produced. The fact that alcohol causes a loss of heat has long been known to Arctic explorers, who invariably avoid alcohol as they would the plague, experience having taught them that it means death.

From these facts, and others similar to them, the inference seems unavoidable that alcohol is a narcotic rather than a stimulant, and this seems to be the conclusion at which many investigators are nowadays arriving. Professor Davis has expressed this view

well as follows :—" It has long been one of the noted paradoxes of human action, that the same individual would resort to the use of the same alcoholic drink to warm him in winter, to protect him from the heat in summer, to strengthen him when weak and weary, and to soothe and cheer him when affected in body or mind. . . . The alcoholic drink does not relieve the individual from the cold by increasing his temperature, nor from heat by cooling him, nor from weakness and exhaustion by nourishing his tissues, nor yet from affliction by increasing his nerve force, but simply *by diminishing the sensibility of the brain and nerves, and thereby lessening his impressions of all kinds, whether from heat or cold, weariness or pain*" (italics ours).

The whole subject of alcohol, however, and its action on the human system is still a controversial one, and equally learned and able men are found to advocate its use (*but only in small quantities*), and to denounce it altogether. But in casting one's eye over the history of the question, one cannot help being struck by the fact that alcohol for many years seems to have been fighting a losing battle, and, the more its properties and effects on the human system are studied and investigated, the more medical men range themselves against it. This has been especially noticeable during the last decade or two, and no better illustration of the truth of the assertion can be given than the figures of alcohol consumption in hospitals. A table we have before us shows that in nine of the leading general hospitals the cost of alcohol per bed was in 1899 22 per cent., and in 1900 43 per cent., less than it was in 1894—*i.e.* the

amount has been reduced by more than two-fifths in six years.

Although alcohol in some form or other, or substances such as bhang, opium, etc., whose action somewhat resembles that of alcohol, appear to have been used in almost every age and clime, it must be remembered that such use has sprung up, not as the result of scientific knowledge, but simply because people found by experiment that these substances produced an *immediate* pleasant effect, or dulled and lessened some unpleasant sensation or other ; content with the *immediate* pleasant effect, little or no heed was paid to a possible *ultimate* harmful effect ; the scientific study of recent times, however, all tends to show that, although the first effect may be (and generally is) pleasant and agreeable and *apparently* beneficial, the ultimate or net effect is a distinct loss or injury.

This much at any rate is certain ; if alcohol were to-day unknown, and then were suddenly discovered, and if people were called upon to pass judgment upon it and decide whether they would have it introduced into their midst or not, and if they were put in possession of all that we now know about it, especially about the terrible effects of excess of it, *and the dangers there are of falling into such excess, and the vagueness and differences of opinion of experts as to what constitutes excess*—there can be little doubt that all reasoning people would indignantly refuse to have anything to do with such an agent, with such extremely doubtful, not to say dangerous, credentials. And even if some were to accept it, the least that such would say would be, to adapt the

words of *The Lancet*, "Let there be no mistake about our voice in this matter ; we must have temperance—extreme temperance—anything else is risky." But as it is, alcohol is in possession of the field, and it is quite a different matter to convince people, however cogent the arguments and facts may be, that an old-established, not to say cherished, possession is a viper in their bosom, from persuading them not to accept a new discovery on the grounds of it being ultimately harmful.

But when all has been said and done on both sides, and whatever the opinions of experts may be, there is only one criterion by which all theories can be tested—the test of practical experience of large bodies of men over long periods of time. This test is provided by the figures of insurance companies ; many of the companies have two groups of policyholders, general and temperance, or non-abstainers and abstainers. But even the non-abstainers are carefully selected, for no life office will give a policy to anyone who is not careful and moderate in the use of intoxicants ; most of the directors, officials and representatives are themselves abstainers, so that they are naturally inclined to draw their proposals on the most sober and moderate among non-abstainers. There is no difference between the two classes other than this one of alcoholic drinks ; the variations in social position, occupation, age, and physical conditions are exactly the same in both groups. Specimen figures are as follows:—Out of 17,500 deaths in the United Kingdom Temperance and General Providence Institution during the last thirty-six years, the ratio of actual to expected deaths was

25 per cent. less among the abstainers than among the non-abstainers. In the Sceptre Life Association there was 24·82 per cent. less mortality in the temperance than in the general section. In the Report ordered by the House of Commons in 1896, the mortality of men between the ages of 18 and 65 of Rechabites (who are total abstainers) was shown to be 25 per cent. lower than that of the average of other friendly societies. The experience of other insurance offices has been similar—viz. that the mortality among total abstainers is decidedly lower than among non-abstainers. The Scottish Temperance Association gives a 10 per cent. reduction on whole life premiums to total abstainers.

Now there is no getting beyond these figures ; insurance companies are not dispensers of promiscuous charity, but business concerns run on business lines, and when a reduction of 10 per cent. is made to total abstainers, it is done, not for sentiment, but because it pays to do so. The figures are unanswerable, and all the talk and theories of the whole world cannot get behind them ; the conclusion is inevitable, that, of men drawn from the same stock and exactly equal in all other respects, those who take alcoholic drinks, not to excess but in moderation only, die appreciably sooner than those who do not take such drinks ; in other words, alcohol must be looked upon as injurious to life.

Of those who take alcoholic drinks, however, by far the greater part do not do so because they really think that alcohol is good for them, and moreover, even if people were convinced that alcohol was injurious, many would still continue to take it ; the

reason being, of course, that people like alcohol, that the sensations it produces are pleasant, that it satisfies (temporarily at least) some craving of the system. The question then arises, what are the cravings that are capable of being satisfied by alcohol? Broadly speaking, these cravings can be divided into two, which may be termed the psychic and the physical. The former is produced by mental, moral and social influences—*e.g.* ennui, grief, etc., which lead a man to resort to alcohol as a means of deadening a certain unpleasant part of his consciousness; with these influences we have nothing to do here. The latter is a purely physical craving of the physical body. Now alcohol not being a normal requirement of the body, it follows that the craving must be due to some abnormal condition. The suggestion is offered here (it is not a new or original one) that one of the most frequent of these abnormal conditions is a badly nourished body—*i.e.* if the body is not given suitable and sufficient nourishment a demand or craving will make itself felt; this demand for suitable nourishment is, in these days of dietetic ignorance and blunders, seldom correctly supplied, and the only way to deaden or remove the unpleasant feeling that something is lacking is to narcotise or deaden the nerves, which can readily be done with alcohol. In addition to badly nourished tissues, another potent cause of the demand for alcohol is the use of other stimulants, especially fleshmeat, which (see Chapter VII.) is stimulating because of the xanthins it contains. This assertion is not mere theory, but is based on actual observation of fact; for it has been repeatedly

noticed by large numbers of people in all parts of the world that, if a well-selected vegetarian diet is substituted for a flesh diet, the craving for alcoholic and other stimulants, which may have been insistent before, automatically and instinctively, and without any effort of will, vanishes. Further, even though previously there might have been great liking for stimulating beverages, in a great many cases this liking is replaced by a positive dislike, alcohol becoming distasteful and obnoxious to the palate, and its effect on the system, instead of pleasant, distinctly unpleasant and irritating, because it disturbs the normal comfortable feelings inherent in a healthily nourished body.

Whatever the explanation may be, there can be no doubt about the fact that the craving for alcohol, in the vast majority of cases at least, disappears with the abandonment of fleshmeat; it has in fact often been said that a vegetarian drunkard is almost unknown. Numerous instances could be given, not only of strictly moderate drinkers who have found that vegetarianism completely kills in them all desire for alcoholic stimulation, but of habitual drunkards who have been reclaimed by the simple expedient of cutting off flesh-foods, sometimes where all other methods had failed; the Salvation Army, for instance, at their Home for Inebriate Women, has found that a well-selected diet of the "kindly fruits of the earth will diminish the craving for alcoholic stimulants. The patients themselves quickly recognise that they are better without fleshmeat, since it acts as a stimulant and they want none." Robert Blatchford, speaking from personal

observation, says, "I begin to see that the great cure for the evil of national intemperance is not teetotal propaganda, but vegetarianism. Let our temperance friends consider this. It is most important. If we can get people to give up eating meat, the drink problem will solve itself."

It would seem then that vegetarianism and food reform, if they do not solve, at least considerably simplify one of the great cancers which is eating out the heart of "civilised" countries—the alcohol question. To persuade a man (if you can), by an array of scientific evidence, that alcohol is bad for him, is often far from being sufficient to prevent him from taking it; the mere physical cravings of a badly nourished and artificially stimulated body are frequently stronger than all the temperance lectures in the world; but nourish the man properly on wholesome, unstimulating food, and the cravings will automatically largely disappear; in other words, take a step back towards nature in matters of food and drink, and you will have taken a step forward away from unnatural and artificial cravings which are the result of unnatural and artificial habits, and which disappear when those false habits are discarded.

CHAPTER XXI

TOBACCO

"The pipe, with solemn interposing puff,
Makes half a sentence at a time enough ;
The dozing sages drop the drowsy strain,
Then pause, and puff—and speak again, and pause again.
Such often, like the tube they so admire,
Important triflers ! have more smoke than fire."

WILLIAM COWPER

ALTHOUGH tobacco is in no sense of the word an article of diet, yet, as there appears to be a certain connection between it and diet, it may be as well to briefly consider the matter here.

As in the case of alcohol, so with tobacco, it is admitted on all hands that *excess* is in the highest degree injurious to the nervous system, and through the nerves to the whole organism ; masses of figures and facts could be quoted to prove the truth of this assertion, but it is nowadays so universally recognised that it is thought this may be assumed as proved.

Experience has also established so clearly the fact that tobacco is highly injurious to young people that legislation has forbidden young people to smoke in Norway, Japan, Switzerland, forty-seven states of the American Union, Australia, Canada, and many other countries, amongst which has just been included the United Kingdom.

Two questions now naturally prompt themselves :

where does excess begin? and where does the age begin (if there is such an age) at which tobacco ceases to be injurious? Let us briefly examine the nature of tobacco, and see why it is injurious in certain quantities and at certain ages.

Nicotine of course is the poisonous element in tobacco; in addition, many other substances (*e.g.* opium) are nowadays largely employed by the unscrupulous manufacturer, in cigarettes especially, in order to flavour, or to increase the craving for tobacco, or for some other purpose; some of those added substances are also injurious, but we can afford to ignore them here and consider only nicotine.

Nicotine is recognised by scientific men and chemists as one of the most powerful poisons known; a quarter of a drop will kill a frog: a seventh of a drop placed on a cat's tongue will kill instantly: a tenth of a drop will kill a fair-sized dog in three minutes: two or three drops distilled into the ear of a sleeping man will produce immediate death. A pound of tobacco contains 380 grains of nicotine, which, if used so as to secure its full effect, would kill 300 men: a cigar contains enough nicotine to kill two men. The smoke of a cigar or cigarette contains about 50 per cent. of the nicotine in tobacco; that part of the nicotine finds its way into the blood of a smoker is proved by the fact that leeches, applied to habitual smokers, have been known to instantly drop off dead, poisoned by the nicotine in the blood.

In these facts there appears to be nothing to warrant the assumption that nicotine, or tobacco, is only harmful in certain quantities or at certain ages; it is a poison in all quantities and at all ages; though

of course its effects are naturally more marked when taken in large quantities or at ages when the system is most sensitive to abuse—*e.g.* during the period of growth ; its effects, in short, are proportional to the amount taken and to the sensitiveness of the organism concerned. If no immediate ill effect is noticeable after taking a small amount, it would be absurd to infer that there is no ill effect at all, simply because we have not the means of detecting it ; the only rational conclusion is that the effects of small doses are too small to be noticeable at once, but, if the doses are continued, they are bound to accumulate and must in time bring harm to the organism which has been, slowly perhaps and imperceptibly, but none the less surely, poisoning itself.

As with alcohol, however, so with tobacco ; most people smoke, not because they think it does them good, but because they like it, because it soothes them—*i.e. deadens or drives away some unpleasant feeling or craving*. Not to weary the reader with a repetition of the arguments set forth in the last chapter, suffice it to say that, whatever the explanation may be, the fact remains that it is a very common experience amongst non-flesh-eaters that the craving for tobacco automatically diminishes or altogether disappears with the abandonment of stimulating food—*i.e. flesh-food*. It is unnecessary to dwell on the close connection between alcohol and tobacco ; the very phrase “smoking and drinking” reveals the intimate association ; it appears, then, that flesh-food, alcohol and tobacco are a trio which form a vicious circle, each aggravating the craving for the others ; but the strongest part of the circle is

flesh-food ; break through part of the circle by discarding fleshmeat, and the other parts, alcohol and tobacco, will automatically become weakened and eventually fall to pieces—wholly or to a large extent.

Robert Blatchford, as typical of many cases, may again be quoted in this connection ; he writes : “ In one way the effects of vegetarian diet have surprised me. I have been a heavy smoker for more than 30 years. I have often smoked as much as 2 oz. of tobacco in a day. I don’t suppose I have smoked less than 8 oz. a week for a quarter of a century. . . . If there was one thing in life which I feared my will was too weak to conquer, it was the habit of smoking. Well, I have been a vegetarian for 8 weeks, and I find my passion for tobacco is weakening. It is astonishing. . . . I have had to get new pipes and milder tobacco. and I am not smoking $\frac{1}{2}$ oz. a day. It does not taste the same ; I am not nearly so fond of it. And I am told that this is quite common.”

CHAPTER XXII

TEA, COFFEE AND COCOA

IT should hardly be necessary to say that the minute amount of solid matter contained in an infusion of tea leaves or coffee has no value as food ; the only food value which the *beverages* tea and coffee possess is due to the other ingredients—viz. sugar, milk, and the *heat* of the water. Cocoa contains a certain amount of nutriment, but the quantity of cocoa which can with any safety be taken is so small as to render the nutriment obtained from it practically negligible.

The great objection to tea, coffee and cocoa lies in the fact that they contain stimulant drugs, which are really poisons ; tea containing thein, coffee caffein, and cocoa theo-bromine. Dr Haig, and those who think with him, class these substances with the xanthins (see Chapter XII.) and find that their action on the system is similar to that of uric acid, etc.—that is to say, although they stimulate by *temporarily* clearing the blood of uric acid, the uric acid is merely thrown out of the blood for the time and deposited somewhere in the system, whence it will emerge sooner or later and produce the inevitable reactionary feeling of depression ; this of course creates a desire for further stimulation, and in many cases leads to the habit of taking tea, etc., every few hours throughout the day, a habit which cannot but be eventually

in the highest degree injurious to body, brain and nerves. There can be little doubt that a great deal of injury to health is caused in this country by the habitual use of strong tea, especially among the poorer classes. With many of them it is a common habit to keep tea leaves stewing on the hob, thereby extracting all it contains (including the tannin, of which more presently) and brewing a beverage which it is no exaggeration to say is a deadly poison.

Although the habitual use of any stimulant cannot be regarded as sound, yet tea does not appear to be as objectionable in this respect as alcohol, for instance; thus Sir Victor Horsley says "Experiments with tea show that there is an acceleration at first, the muscle contracting more quickly, and that there is an improvement in the force; but there is no after paralysing effect when the stimulation stage has passed—in fact, there is no loss of power at all. . . . There is no question about the accuracy of the fact. . . . The contrast between alcohol and tea was most clearly marked in this matter of volitional movement."

A further objection to tea is due to the tannin it contains, this tannin being the same substance which is used for tanning skins, owing to its property of hardening. It has been well established that tannin seriously impairs digestion; thus Schultz, Bunton, Wolff, Fraser, Roberts and others found that while 94 per cent. of proteid was digested when no tea or coffee was taken, the addition of tea or coffee reduced the percentage to 66 and 61 respectively, while the addition of distilled water made no difference. A. W. Duncan, in "The Chemistry of Food," also states

that "the action of saliva on starch is powerfully retarded by tea; this is due to the tannin. Coffee and cocoa are without effect."

If tea be infused for not more than three minutes, better even less, the infusion will contain comparatively little tannin¹; this will be noticeable even to the taste, the characteristic bitter taste of tannin being absent. Perforated receptacles, or infusers, of various kinds can now be obtained, into which the tea leaves can be placed and in which they may be removed from the teapot after the desired time has elapsed.

China tea is said to contain about a third as much tannin as Indian or Ceylon teas. The Universal Digestive Tea Co., Kendal, prepare a tea in which much of the tannin has been neutralised by oxygen, the tea being said for this reason to retard digestion much less than ordinary tea.

It is a significant fact that the reputed first users of tea, the Japanese and Chinese, drink very weak tea that has been infused for a few moments only.

¹ We know of no experiments which have ascertained *how much* tannin is found in infusions of one, two, three : : . minutes, but there is certainly much less in a two-minute than in, say, a five-minute infusion.

CHAPTER XXIII

MENTAL CONDITIONS AND PHYSICAL HEALTH

"Every seeker after health should be absorbed by the thought that better health is possible."

ALBERT BROADBENT

"Talk health. The dreary, never-ending tale
Of mortal maladies is worn and stale.
You cannot charm, or interest, or please,
By harping on that minor chord—disease.
Say you are well, and all is well with you,
And God shall hear your words and make them true."

ELLA WHEELER WILCOX

ALTHOUGH the title of this book does not, properly speaking, include the influence of the mind, emotions, etc., on health, yet this influence is so important, and is often so intimately connected with diet, that a brief reference to the subject may perhaps not be out of place.

A good deal of attention has for some years past been drawn to the general subject of the influence of the mind on the body, and a number of schools, Christian Scientists, Faith Healers, Mental Healers, Suggestionists, etc., have sprung up, and count their followers by hundreds of thousands. Although the claims made by these schools are often wild and extravagant, and their explanations and theories fanciful to a degree, yet to ridicule and reject without examination the whole subject, as the product of hysteria and "imagination," and as having no real

practical significance (as the majority of people do in this superficial age), is as foolish as it would be to refuse to make use of any article of commerce simply because the manufacturers make exaggerated claims for their wares. However that may be, it is our belief that any person capable of appreciating evidence and of forming an unprejudiced opinion, who will take the trouble to investigate or read the innumerable accounts, thoroughly well authenticated by unimpeachable witnesses, of the benefits to physical health brought about by the various schools by non-physical means, will be bound to admit that, after making due allowance for exaggeration and inaccurate representation, there is a very considerable nucleus of solid fact remaining to the credit of the various systems.

It is not proposed, however, to enter into any account of these systems, nor to discuss any theories of their *modus operandi*; it is intended only to draw attention to the one broad conclusion which we consider to be inevitable from this line of evidence—viz. that there is *some* connection between mental conditions and bodily health, that, whatever the explanation may be, there can be no doubt of the fact that mind and thought can and do exercise an important influence on physical health.

Illustrations of the physical effects of purely mental causes are common even in everyday life; thus the mere mention of delicious food will often cause the glands to secrete saliva, when we say "the mouth waters": a piece of bad news, grief, anxiety, fear, nervousness, etc., will dry up the salivary glands and, as we say, "take away the appetite": fear,

anxiety, or even sometimes joy, may drive the blood from the face and make it pale: shyness, etc., may stimulate the flow of blood to the cheeks and cause a "blush": the mention of a name or incident may so affect the nerves as to make the body tremble all over: nervousness or excitement may so affect the peristaltic motion of the intestines as to cause diarrhoea: experiments have proved that the flow of blood to almost any part of the body can be increased by merely concentrating the attention upon the part: fear or grief may destroy the pigment of the hair and turn it white in a few hours, and so on: instances could be multiplied almost indefinitely.

The principle that fear increases the susceptibility to disease has in modern times been reaffirmed; it was known to the ancients long ago, as illustrated by the old Egyptian story of a man who, meeting the Plague going up the Nile, asked her where she was going; she replied, "I go to claim 50,000 people." On her return a few months later the man reproached her with killing 100,000, double the number she had said she was going to take. "No," she said, "I killed 50,000 only: fear killed the rest." T. J. Hudson¹ writes, "It is well known that there is no disease of the human body that may not be created, or simulated, by the power of mind when stimulated by suggestion. It is asserted by physicians of experience that in cholera epidemics a large proportion—more than half—of the cases are the result of 'fear,' otherwise suggestion. There is nothing to distinguish such cases from those of true Asiatic cholera, except, perhaps, the absence of the true

¹ See "The Law of Psychic Phenomena."

cholera germ, or bacillus, in the suggestive cases. It is certain that all the salient symptoms of true cholera are present in that which is induced by suggestion, and that the percentage of fatal cases is greater in the latter class of cases." William Dale¹ says, "Fear, anger, revenge, grief, love, hope, joy, friendship, may all affect physical condition. The efficacy of strong emotion in producing or helping to produce such conditions as diabetes, chorea, and epilepsy is well recognised, and, we venture to say, undoubted."

Of profound interest and significance are the researches of Prof. Gates, of Washington; he writes, "In 1879 I published a report of experiments showing that, when the breath of a patient was passed through a tube cooled with ice so as to condense the volatile qualities of the respiration, the iodide of rhodopsin, mingled with these condensed products, produced no observable precipitate. But, within five minutes after the patient became angry, there appeared a brownish precipitate, which indicates the presence of a chemical compound produced by the emotion. This compound, extracted and administered to men and animals, causes stimulation and excitement. Extreme sorrow, such as mourning for the loss of a child recently deceased, produced a grey precipitate; remorse a pink precipitate, etc. My experiments show that irascible, malevolent, and depressing emotions generate in the system injurious compounds, some of which are extremely poisonous; also, that agreeable, happy emotions generate chemical compounds of nutritious value,

¹ In *The Medical Monthly*, 1894.

which stimulate the cells to manufacture energy. . . . My experiments have demonstrated that every emotion of a false and disagreeable nature produces a poison in the blood and cell tissues. These poisons affect the health of the germ-cells. During pregnancy, life-depressing and unpleasant emotions—grief, anger, sorrow, etc.—will, through the poison generated, affect the development of the foetus." Cases are on record where a mother, giving way to violent anger, has made the child at her breast ill owing to the poisons generated in the milk by her emotions.

Also of the utmost importance in this connection are the researches of Prof. Pawlow, W. B. Cannon, and others, which have conclusively shown that the secretion of digestive fluids is controlled by psychic influences—*i.e.* the psychic conditions of pleasurable anticipation, of gustatory enjoyment, etc., stimulate the flow of saliva, gastric juice, etc., and the absence of such conditions inhibits the secretion of the fluids and so impairs digestion. So important has Pawlow found psychic influences on digestion to be that he has said, "*Appetite is Juice*," meaning that relish for food is essential to good digestion. The experiments have further demonstrated, not only that certain emotional states encourage digestion, but that other emotional states retard or even completely arrest digestion. W. B. Cannon says, "There is no doubt that many emotional states inhibit peristalsis . . . signs of emotion, such as fear, distress, or rage, are accompanied by a total cessation of the movement of both large and small intestines." Pawlow, speaking of experiments on cats and dogs, says, "Stomach

movements are inhibited whenever the cat shows signs of anxiety, rage or distress." If such is the case with dumb animals it would appear probable that the far stronger emotions and feelings of human beings would produce even greater effects on the human digestive processes.

In facts of this nature we have from the laboratory of the scientist corroboration and amplification of what has long been a matter of lay observation—viz. that mental and emotional states exert a powerful influence on the vital functions of the body, especially on the processes of digestion; hence the state of mind at the time of taking food is a matter of practical moment and one worthy of attention. The common habit of forcing food upon people when, owing to grief, worry, nervousness, excitement, or some other emotional state, there is no appetite, is shown to be foolish, because we now know that while strong emotions of these kinds prevail the absence of appetite is Nature's warning that the system is not in a fit state to digest food; the only rational course is to wait until the emotion subsides and the sensation of hunger returns, before giving food.

By similar reasoning, it is easy to see that what may be termed psychological physiology lends scientific sanction to the custom, instinctive almost all the world over, of rendering meals as pleasant as possible, by providing agreeable companions and conversation, by setting out the table with fine linen and flowers, by serving up food daintily and on rich and graceful dishes, by providing music, and so on; "the æsthetics of eating," says Chittenden, "are not to be ignored, since they have an im-

portant influence upon the flow of the digestive secretions."

Above all things psychology teaches us to avoid all suspicion of fussiness or morbidity in feeding the human animal ; apart from being a nuisance and a bad example to other folk, nothing could be less conducive to health than to be perpetually asking oneself whether this, that or the other will disagree with one, and to be constantly and anxiously on the lookout for symptoms of such disagreement. T. J. Hudson relates a typical case of a young man who, from hearing so much about appendicitis, became so fearful of contracting the disease, that he asked a doctor where the appendix was ; a few days later he told the doctor that he was sure he had appendicitis developing, because he had a pain at the very spot indicated by the doctor. The latter, however, had taken the precaution of pointing out the wrong spot to the young man, and so was able to assure him that his complaint certainly was not appendicitis as the appendix was not on that side of the body at all. The great Dr Abernethy no doubt had such people in mind when he said, "When a man begins to dissect himself he will soon be a fit subject for the undertaker."

To be excessively particular about one's food, and to be always morbidly on the lookout for trouble, is one extreme ; the other extreme is to eat and drink anything that comes, and "ask no questions." The course for the man of sense lies obviously between these two extremes ; it is quite possible to feed oneself scientifically and rationally, and to observe the peculiarities and weaknesses (which few people are without) of one's own system without in any way

being morbid or fussy about it, just as a man may feed his animals scientifically, and carefully notice the amount and nature of the food on which each one does best, without in any way being over-anxious or morbid about them.

A corollary to Gates' researches, which may perhaps have occurred to some, is well expressed as follows by A. W. Duncan¹:—"It has been observed that the eating of the flesh of some trapped animals has produced severe symptoms of poisoning. The pain and horror of having a limb bleeding and mangled in a most cruel steel trap, the struggles which only add to the misery, slowly being done to death during hours or even days of torture, has produced in their bodies virulent poisons. Leucomaine poisons have also been produced by the violent and prolonged exertions of an animal, fleeing from its pursuers, until its strength was completely spent. We must not expect the flesh of any hunted or terrified animals to be wholesome. Animals brought in cattle ships across the Atlantic, suffer acutely. After rough weather they will often arrive in a maimed condition, some being dead. To this is added the terror and cruelty to which they are subjected whilst driven by callous drovers, often through a crowded city, to the slaughterhouse to which they have an instinctive dread. It is to be only expected that the dead flesh from such animals, should contain an usually large quantity of the more poisonous flesh bases." The cruel and terrifying conditions under which myriads of animals are now slaughtered in England and other countries, thus lends an additional danger to the use of their flesh as food.

¹ See "The Chemistry of Food and Nutrition."

CHAPTER XXIV

THE ETHICS OF DIET

“ Nothing is foreign—parts relate to whole :
One all-extending, all-preserving soul
Connects each being, greatest with the least—
Made beast in aid of man, and man of beast :
All served, all serving—nothing stands alone.
Has God, thou fool, worked solely for thy good,
Thy joy, thy pastime, thy attire, thy food ? ”
POPE’S “ Essay on Man ”

“ No civilisation is complete which does not include the dumb and defenceless of God’s creatures within the sphere of charity and mercy.”—QUEEN VICTORIA

THE ethical and moral aspect of diet, in so far as the use of animals for food is concerned, has purposely been left to be treated last of all, not by any means because it is considered of proportionately small importance, but purely out of deference to the materialistic spirit of the age, which keeps spiritual and moral problems rigidly apart from physical problems, and which refuses to be satisfied with anything other than material, physical reasons and arguments for what it regards as such purely physical matters as eating and drinking.

Most people apparently not thinking it morally incumbent upon them to inquire into the conditions under which their tables are supplied with the flesh of animals, comparatively few have taken the trouble to investigate such matters ; moreover, to do people

justice, the great majority seem to take it for granted that, thanks to modern improvements, the whole business of rearing, transporting and butchering animals is nowadays so scientifically carried out that little or no suffering is inflicted on the victims, or at any rate that the pain inflicted is so trifling as to be scarcely worth taking into account while so many other problems of greater moment to man still remain unsolved. Hence the scruples which humanitarians—a very small minority in the community—profess against the slaughter of animals for food are apt to be regarded by other folk as “maudlin sentimentalism.” Before discussing how far these scruples are justifiable, it may be useful to briefly examine some of the actual facts connected with the transportation and butchery of animals.

In modern times very large numbers of animals are transported, often for great distances, by road, rail and sea; during such transport it is inevitable that they must at times suffer severely; closely penned up in railway trucks or between the decks of ships, generally unable to lie down until the end of the journey or voyage, exposed to heat and cold, and frequently kept for long hours without food or water, their lot is painful enough at the best of times; but in rough seas the pitching and tossing of vessels often throws them about so badly, bruising them and breaking their bones, that many die of their injuries, or have to be killed on board, while large numbers are disembarked in such a mangled condition that they have to be slaughtered on the quay to prevent them dying of their injuries. The following are a few quotations on this matter :—

The Daily Chronicle, in a short leader, says :

"Attention may very fitly be drawn to the terrible tale of the sufferings and eventual loss of nine-tenths of a consignment of 381 cattle shipped in the *Angers* at the port of Gladstone, in Queensland, only 32 of which survived to be landed at Deptford—after a 79 days' passage. . . . The unfortunate beasts began to die off from the very first day out, and the decks of the steamer speedily became a very charnel-house. Three gales of wind struck the *Angers* and carried away the cattle fittings, throwing the beasts about and bruising them, so that they died sometimes at the rate of 30 or 40 a day."

A few extracts from the diary of one of the men in charge of the cattle are as follows :—

"Slaughtered 5 dying cattle, 2 dreadfully bruised and ruptured, one with hip bones knocked into a jelly, and badly cancered. . . . Hips, hocks, and fore quarters of cattle are a mass of jelly, blood and bruises. One very badly sprained, trying to rise, fell and died. The vessel rolling very badly. . . . Commenced discharging dead cattle. . . . All hands engaged getting them overboard. . . . Some putrid from foul atmosphere. . . . Stench very bad. . . . Crew being physicked to prevent vomiting."

In "Cattle Ships," SAMUEL PLIMSOLL, M.P., says :

"On several occasions I saw the men pour paraffin oil into their ears, which, as soon as it reached the brain, caused the poor brutes to fairly shriek with pain. Occasionally the ears were stuffed with hay, which was then fired; while in many instances the tails were snapped in the endeavours of the cattlemen to force the animals, that had lain down from

sheer exhaustion, to regain their feet. The commander of the vessel was appealed to, in the hope that he would order a cessation of these cruel practices. 'I am, however,' said he, 'powerless to interfere in the matter. My duties are simply to carry out the instructions of my employers, the cattle being regarded by me as freight, nothing else.' The reason that these animals, no matter how horribly mutilated, sick, or suffering, are not put out of their misery, is to be found in the imperative rules of the insurance companies both in New York and in London."

The Board of Agriculture Report, 1894, contains the following :—

"The worst class of bruises, however, are described as those which occur through animals falling or lying down on shipboard and getting trampled on. To these causes are ascribed not only extensive bruises of the muscles, but broken ribs and hips, and laceration of the subcutaneous tissues which connect the skin to the subjacent fasciæ of the back, at times so extensive that when the beast, having been flayed along the legs and underportions, is slung up by the legs for the purpose of completing the operation, the skin on being loosened round the tail, is described as dropping to the ground through its own weight. Thus Mr Davies, ex-President of the Liverpool Butchers' Association, told us of a lot of seven bullocks so badly injured in this way that when they were hoisted, as described, in the process of flaying 'as soon as the hide was loosened from the tail, and cut off there, the hide simply flopped on the floor, there not being sufficient left intact to hold the hide on the beast's back.'

"Again, Mr Nelson, an extensive cattle salesman in Glasgow, declared that he had 'hundreds and

hundreds of times ' himself seen, when the cattle were partially flayed, the hides fall right off them owing to the bruises, and had often wondered how cattle could live and travel and stand the market in the condition which was revealed when the hide was taken off. As to broken ribs, Mr Cassidy, an Irish dealer, who passed through his hands over 6000 cattle per annum, put the number of cases of broken ribs at between 100 and 150, and told the Committee that out of one lot of 20 fat cattle which he had sold, the purchaser complained that he found ten of them with the ribs broken."

SIDNEY BEARD, in an address delivered in 1905, said :

"On Sunday last a vessel arrived at Plymouth, having been 15 days encountering heavy seas ; of her living freight of cattle, 300 had been killed by being thrown about on each other in a struggling mass, or so badly mutilated that slaughter was resorted to. *The Western Morning News* report stated that the rest were badly knocked about. *The Daily Telegraph* in an article on the cruelties of cattle transport stated that when the wretched beasts were so mutilated as to be doomed, and the movements of the vessel precluded the men from dealing with them, they were made *by means of tortures impossible to describe in a public newspaper, to jump overboard from sheer physical pain.* This Plymouth case is not an exceptional one ; only a few weeks since 1000 cattle were lost on one vessel and a Veterinary Department Report to the Privy Council records that in one year 14,024 animals, in course of transit to this country, were thrown into the sea (by what methods you must imagine), 1240 were landed dead and 455 were slaughtered on the quays to save them from dying of their wounds. You may form some conception

of the horrors of a cattle boat, although nothing but seeing it in mid-ocean could make you sufficiently realise what a floating inferno of tortured animal life it is. Let me tell you that during every year three millions of living animals are exposed to this suffering—nearly 10,000 a day arriving upon our shores.”

An article in *Chambers's Journal* for February 1898, referring to the Transatlantic cattle trade, has the following:—

“Frequently bad weather comes on, and then a few short hours suffice to convert the vessel's decks into a veritable shambles. Often the fittings are of the flimsiest character, and as the ship rolls and pitches they carry away, and the now unprotected inmates of the pens are thrown hither and thither as the vessel rolls to port or starboard. To add to the confusion, a heavy sea may come aboard, and, after sweeping dozens of unfortunate sheep away, complete the hideous scene taking place on the cattle deck. The picture as sketched to the writer by an officer who had witnessed it—not once or twice, but many times—is horrible in the extreme. Helpless cattle dashed from one side of the ship to the other, amid a ruin of smashed pens, with limbs broken from contact with hatchway combings or winches—dis-horned, gored, and some of them smashed to mere bleeding masses of hide-covered flesh. Add to this the shrieking of the tempest, the impossibility of the crew to get from one part of the ship to the other, and the frenzied moanings of the wounded beasts, and the reader will have some faint idea of the fearful scenes of danger and carnage occurring on these floating farmyards. . . . Many of the cattle die not from the violence of the weather; they are simply suffocated through being packed in the ill-

ventilated and confined 'tween-decks. If anything, the scenes enacted in these regions of the vessel, especially on the occasional boats, are even more horrible than those in which wind and sea are the principal actors. The stench in this foetid atmosphere is described as horrible, the dead beasts, advanced, perhaps, in decomposition before death ended their sufferings, are often removed literally in pieces, so cribbed and cabined is the space in which they are carried; and when it is remembered that the mortality in the 'tween-decks is greatest while the vessel is steaming through the tropics, the reader's imagination can easily fill in the horrible details of the scenes enacted in the South American Cattle Boat."

About 45,000,000 live stock are transported annually in the United States. Describing this transport, one writer says: "On one wagon which came only 120 miles, were counted the carcasses of 13 steers trampled to death. They got down under the hoofs of others as the car jerked and bumped along. In the case of one animal, one horn was knocked off, an eye gouged out, ribs broken, the paunch and softer parts were trampled into bags. The other 12 were in a similar condition. Thousands of stock suffer this fate each year. . . . Estimates based on known statistics . . . indicate that about 60,000 animals are taken from the cars dead yearly, and also about 50,000 injured and mutilated. . . . Over 448,000 animals were involved in cases cared for by the Anti-cruelty Societies in the U.S., last year. . . . In one terrible photograph is shown what remains of nearly 1200 head of stock, starved to death near the home of their well-to-do owner."

Opinions differ as to the best means of killing in the slaughter-house; the English use the poleaxe, Germans the mallet, while Italians stab and Jews

cut the throat: the mere fact that advocates of each method generally denounce the other methods as cruel and brutal, *although employed by equally humane and intelligent people*, goes far to show that a great deal of cruelty and suffering is inseparable from all the methods. Thus, although the poleaxe, wielded by a skilled and strong man, will fell an ox at one blow, or at most two or three, *it is absolutely imperative*, as *The Lancet* says, *if there is to be no cruelty, that none but well trained and highly trained slaughtermen should be allowed to kill*. It is scarcely necessary to remark that by no means *all* slaughtermen are "well trained and highly trained," any more than *all* men of any other trade are so; moreover, a man is not born highly trained, but becomes so by long practice; further, in this country, where a public slaughter-house is the exception rather than the rule, there is no one to see that only highly trained slaughtermen do the killing; frequently boys are put to the work who have insufficient strength to wield the heavy instrument. In addition to the suffering caused during the few moments during which the animal is being done to death, the agonies of terror which they not infrequently undergo while being dragged up by the windlass to the slaughtering pen, or while waiting their turn, often in full view of others being slaughtered, and of carcasses being dressed and hung up, and surrounded by the dank odour of blood and all the sickening stench of the slaughter-house—are indescribable, and not pleasant to dwell upon, even in thought. Space does not permit more than a few quotations on this matter from eye-witnesses:

A journeyman butcher, writing to *The Staffordshire Daily Sentinel*, stated: "The first lesson a butcher's apprentice generally receives is how to torture the animals which are to be slaughtered, and he is allowed to use the axe before well able to lift it, to the indescribable agony of the poor beasts. This I have seen occur daily where a large amount of work has to be done. . . . I have also seen cows kicked, their tails twisted and sawn, and their eyes burst, before they could be got into the slaughter-house, and they are frequently kept for two days without food and water before being killed."

Commenting on the above, SIDNEY H. BEARD says: "Some persons may say this cannot be true! To such let me reply, that a hide merchant in this country quite recently received a bullock skin with 27 punctures in the head; at Newcastle, a butcher was lately convicted of skinning a bullock while alive, and that another hide merchant recently wrote to us offering to send the skin of a bullock's head showing ten holes made with the poleaxe, and stating in his letter, '*we receive such by hundreds.*'"

Dr DEMBO says: "That the ox feels every succeeding blow is proved by its conscious movements, by the bellowing and groaning to which it sometimes gives vent, and by its turning round from one side to the other. The butchers know that very well, and continue to strike the animal until the movements cease—*i.e.* until they are sure that they will not jump up any more. One must see the deep holes made with the hammer in the bones of the skull to form a right conception of the agony the animal has to suffer in this method of killing. Amongst my notes there is a case (and I could give the name of the slaughter-house if necessary), where the animal was struck with the hammer *eleven* times before it fell."

Dr JOSIAH OLDFIELD writes: "It is strange how rapidly the poor animal becomes conscious of its danger, and if the first attempt is unsuccessful, it is often very difficult to induce it, in spite of all the shoutings, and cursings, and blows, to come near enough for a second trial. As soon as the chain is over the horns, the veritable fight for life begins. It feels the power drawing at its head, and with all its might resists. The man behind prods it in tender places, and it shrinks forward from the blow; an inch farther forward; it tries to get that inch back again, but the force before is inexorable as fate; a dexterous twist of the tail, and in sharp agony it rushes a step onward; another foot nearer to death; its head is now just inside the dark doorway, and its keen smell detects the dank odour which fills the place. In the semi-darkness ahead, it sees the blood-bespattered slaughtermen in their smocks, and a sense of infinite despair and terror seems to come over it.

"Great, strong bullocks and cows, full of sensibility and with nervous organisations acutely perceptive, are so appalling in their terror! Their eyeballs starting; their tongues protruding; the hard, rapid breathing; the head dragged forward by the chain; every muscle at its fullest tension; every hair on end; perspiration streaming from every pore, and bellowing, or still more pathetically moaning, they are forced on towards the fatal ring. Slipping on the blood-slimed floor they fall, but every fall is only a little nearer the end. The bruises, the skin scraped off, the strains, are unheeded, it is *terror* which predominates.

"It is this prelude of mental as well as physical suffering which stamps all the forms of slaughtering of large animals of highly developed organisations. The battle may rage about the Jewish shechita, the Italian stab, the German mallet, or the English pole-

axe, but the preliminary *via dolorosa* is the same in all, and is soul-revolting in every one."

The same author writes: "The total sum of agony which is inflicted in the public and private slaughter-houses of the land is too terrible to contemplate calmly. I have seen a fine young sensitive cow dragged up by the windlass to the ring, and then as the slaughterman brought down the pointed pole-axe with all his force, he missed the spot, and the weapon struck into the eye, and burst it, and tore its way into places where the presence of many sensitive nerves would cause the most atrocious agony. With bellowings of anguish, the poor creature dashed her head madly again and again against the wall, and it was some time (which seemed like centuries) before a blow was brought home and she stiffened out and fell."

The Daily Chronicle of 9th December 1895 published the following:—" . . . A slaughterman was summoned for taking the entire skin off a bullock's face before the animal was dead. The man pleaded that 'if they had to wait until the beast was dead they might stand by for an hour.' The man was convicted and sent to prison for a month. When remonstrated with by a country butcher for half killing a sheep and then proceeding to skin and take off one of its legs, another slaughterman replied, 'Do you wait? We never do.' . . . The annals of the R.S.P.C.A. show many prosecutions by their officers, who, during casual visits, have discovered slaughtermen engaged in skinning sheep before such animals have been effectually killed. If these instances have been detected during occasional visits, it is really appalling to think what horrors, in degree of cruelty and in number of victims, may have been enacted during their absence."

Some idea of the number of animals that are slaughtered for food purposes may be obtained from the following figures:—

A paragraph in *The Cosmopolitan* thus describes the slaughter which takes place in one of the large packing firms alone:—"Imagine a procession of 10,000 cattle marching two by two, in a line 15 miles long; let 20,000 sheep follow them, bleating along 12 miles of road; after them drive 16 miles of hogs, 27,000 strong; then let 30,000 fowls bring up the rear, over a space of 6 miles; and in this whole caravan, stretching for nearly 50 miles and requiring two days to pass a given point, you will see the animals devoted to death in the packing-houses of Swift & Co. in a single day."

One Chicago concern alone in one year killed 8,000,000 animals—cattle, sheep and pigs, and employed 18,433 men.

In England alone more than 1,000,000 cattle, 7,000,000 sheep, and 2,000,000 pigs are slaughtered in one year. This works out at nearly twenty violent deaths a minute, day and night, and it refers only to the higher and more sentient creatures, omitting the thousands upon thousands of rabbits, hares, fowls, ducks, turkeys, birds, etc., which are slaughtered every day in order to swell the "food supply" of the nation.

The statistics furnished by Sir Robert Giffen to the Royal Commission on Agriculture show that at least 1,000,000 cattle, sheep and pigs are put to death every day in Christian countries—this being at the rate of nearly 700 per minute, or more than 11 per second, day and night.

The above quotations, which could be multiplied almost indefinitely, cannot but make it abundantly clear that, as *The British Medical Journal* says, "*There is not a shadow of doubt that the use of animals for food involves a vast amount of pain.*" To convey such huge numbers of sentient animals by road, rail and sea, for hundreds or thousands of miles, and to slaughter them, without inflicting an amount of suffering which in its totality cannot but be appalling, would be, even if the most elaborate and expensive precautions were taken (for accidents will happen even in the most carefully managed enterprises), practically impossible, and certainly in the highest degree improbable in an age which counts profits of vastly greater moment than the sufferings of cattle.

Many and various are the arguments put forward by carnivorous peoples in defence of their killing customs; it may perhaps be well to briefly examine some of them.

While admitting that animals—fortunately for them—do not feel pain as acutely as human beings do, yet it would be absurd (for anyone at least who has ever had anything to do with animals) to deny that they can and do suffer intensely if ill-treated. Buchner, in "*Mind in Animals*," says, "Modern thought no longer recognises in animals a difference of kind, but only of degree"; Charles Darwin said, "The senses and intuitions, the various emotions and faculties, such as love, memory, attention, curiosity, imitation, reason, etc., of which man boasts, may be found in an incipient, or even sometimes in a well-developed condition, in the lower animals." The mere fact that animals do not feel so acutely as,

under similar treatment, human beings would, clearly does not justify the *unnecessary* infliction of *any* pain on them; the matter is one of principle, not of degree.

In Europe and America it is frequently said that man, being "lord of creation," can do as he pleases with animals, can hunt, kill and eat them, or let them live as he pleases. The fact that man, however, by reason of his superior endowments, *can* do as he likes with the animal world, affords no more reason why he *should* utilise his superior powers to inflict needless cruelty upon them than the possession by civilised nations of money and gunpowder justifies them in subduing weaker races and making slaves and concubines of them, or inflicting any other cruelties. The nations that style themselves civilised are gradually recognising that power carries with it obligations, that it is the duty of the strong to protect and help the weak rather than their prerogative to bully and stamp them underfoot, and there can be little doubt that, as humanity progresses, this principle will be extended not only to the human, but to the animal world also. The principle, in fact, is already recognised, in degree, by the mere existence of such a body as the Society for the Prevention of Cruelty to Animals, and by the fact that certain forms of cruelty (the so-called "sports" of cock-fighting, bull-baiting, pigeon-shooting, and others) have been forbidden by legislation, while certain others are threatened with similiar suppression.

It is also quite common to hear people in Western countries say, "But what are animals for if not to be killed?" By parity of reasoning one might say,

"What are savage races for if not to be shot down and killed, or led away captive and made into slaves, and worse things?" Or as well say that men are made for Bengal tigers to eat, or that "man was created solely for the various parasitical animals to feed on, because they do feed on him."¹ Is man to assume in his arrogance, simply because he may not happen to know the object of animals' existence, that Nature has no more beneficent design than that they should exist solely to be thoughtlessly and ruthlessly slaughtered? All nature cries out against such a view, for the love of life, the instinct of self-preservation, as science calls it, is recognised to be the strongest of all instincts implanted in all creatures, thus showing clearly, if anything in nature is clear, that Nature's object is to preserve life as long as possible. Or, to put the matter in another light: if Nature intended animals to be killed by *man*, how is it that she, displaying elsewhere such fertile ingenuity in adapting means to ends, has omitted to provide men, as she has true carnivora, with talons to seize, teeth to tear, and carnivorous constitutions to digest the flesh of animals?

Still clinging to the idea that killing is indispensable, some will say that "nature is red in tooth and claw," that all creation lives by preying on itself: big fishes eat little fishes, birds eat insects and grubs, animals devour each other, and so on. Though perfectly true as far as it goes, this affords no reason why man, the highest product of nature of which we are aware, and gifted with reason and intelligence, should kill animals ruthlessly and unnecessarily, and

¹ Smith's "Fruits and Farinacea."

moreover *against the design of Nature so far as that design is revealed to him by his own constitution.* As well say that, Nature being red in tooth and claw, men should help to keep her claws bright with blood by fighting and killing each other.

“That there is pain and evil, is no rule
That I should make it greater, like a fool.”

LEIGH HUNT

A little deeper knowledge of the inner significance of Nature's evolutionary methods would reveal the fact that a beneficent design lies behind the fierce, relentless struggle for existence ; for thus, for example, has been developed the fleetness of the horse, the nimbleness of the goat, the strength of the ox, the keen scent of the dog, and so on. But the slaughter of animals by man is quite another matter ; for this is no case of elimination of the weakest and selection of the fittest for survival, neither is there any opportunity for animals to fight for their lives, and thus develop for the benefit of their race any useful faculties or qualities—unless it be fear and hatred of man. To wrench the killing away from its purpose and to twist it into a justification of wholesale and promiscuous slaughter, which serves no more useful purpose than the gratification of an utterly unnecessary and unnatural, and probably injurious, habit, is not only bad logic, but unworthy of creatures who boast of their reason and lay claim to feelings of kindness towards the defenceless creatures that are placed in their power.

It must be apparent that the various pleas that carnivorous peoples put forward in the attempt to justify their killing customs are really more of the

nature of excuses than reasons for customs which they are loth to discard, and would scarcely be considered valid reasons or arguments among thinking and humane people for initiating killing customs, supposing that such customs were not already in existence. One plea only could be accepted as valid and sufficient for habits of living which all admit involve a vast amount of cruelty and suffering to the animal world—the plea of necessity; and this plea at once falls to the ground, science and experience having indubitably established the fact that flesh-eating is totally unnecessary for the maintenance of human life.

The majority of civilised peoples have reached the stage of moral development where kindness and consideration, in a word humaneness, towards both men and animals, is generally recognised as right and proper; this humane feeling, like other virtues, has taken long ages to develop and will, let us hope, go on developing for many years still. Thus it is comparatively recently that slave-owning has been given up as unsuited to humane-minded peoples; still more recently have lunatics ceased to be treated as worse than criminals, and have received the same treatment and nursing as is accorded to other sick people; at the present day the modern treatment of criminals is being seriously called in question and attempts are being made to substitute a gentler and more humane treatment. Not only to our fellow-men but also towards animals has the feeling of humaneness developed and extended itself. "Why should the law refuse its protection to any sensitive being?" asks Jeremy Bentham. "The time will

come when humanity will extend its mantle over everything that breathes. We have begun by attending to the condition of slaves; we shall finish by softening that of all the animals which assist our labours or supply our wants." "Because the heart beats under a covering of hair, feathers, or wings, is it, therefore, to be of no account?" (JEAN PAUL RICHTER).

As already said, the principle that it is unworthy of moral and high-minded people to inflict any *unnecessary* suffering on anything that can feel, is already recognised by the public support given to such societies as the S.P.C.A., and by the general feeling which has demanded legal suppression of some of the most obvious forms of cruelty to animals. The slaughter of animals, in order to supply an utterly *unnecessary* article of food, is therefore a matter of degree only; the majority of people in European countries, when they think about it at all, appear to think that the cruelty involved in their flesh-eating habits is not sufficient to call for a relinquishment of those habits; in Eastern countries, on the other hand, the majority think otherwise. Reasoning and argument will seldom induce a man to take a humaner view of these matters than he already does; it is a matter of growth, not so much of the intellect as of the heart.

The simple principle of not inflicting *needless* or *useless* pain on any sentient creature should not be misunderstood (as it frequently is) as being so far opposed to common-sense as to mean that it is ethically unsound to kill anything under any circumstances—a stinging mosquito or a man-eating tiger,

for instance. "If we must kill," says Henry S. Salt, "whether it be man or animal, let us kill and have done with it; if we must inflict pain, let us do what is inevitable, without hypocrisy, evasion, or cant. But (here is the cardinal point) let us be assured that it *is* necessary; let us not wantonly trade on the needless miseries of other beings, and then attempt to lull our consciences by a series of shuffling excuses which cannot endure a moment's candid investigation." Ovid and Cowper have expressed the same principle as follows:—

"Take not away the life you cannot give,
For all things have an equal right to live.
Kill noxious creatures where 'tis sin to save,
This only just prerogative we have;
But nourish life with Nature's kindly food
And shun the sacrilegious taste of blood."

OVID

"The sum is this: if man's convenience, health,
Or safety interfere, his rights and claims
Are paramount, and must extinguish theirs:
Else, they are all—the meanest things that are—
As free to live, and to enjoy that life,
As God was free to form them at the first;
Who, in his sovereign wisdom made them all—
Ye, therefore, who love mercy, teach your sons
To love it too."

COWPER

A further ethical argument against the use of animal flesh for food is the degrading and brutalising effect of their work upon slaughtermen and others engaged in the flesh traffic. Let any man or woman of refinement and culture who questions this statement spend an hour or two in a shambles

or packing-house ; let them see the felling and the bleeding, the corpses flayed and cut up, the entrails and organs taken out ; let them see the butchers stabbing and slashing, the warm blood gushing out on the floor, splashing over the men and everywhere, and the air heavy and reeking with its dank smell ; let them see all these, and the many other sights connected with the organised killing of animals, and they will not require further proof that such work is brutalising to those who are forced to perform it, nor will they wonder that many slaughtermen can only bring themselves to do such work when partially under the influence of liquor. But let not the fastidious visitor console himself with the reflection that he is not responsible for such dirty work ; such reasoning is puerile ; those who demand flesh and blood to eat kill the animals by proxy, and are morally responsible for the horrors known to be inseparable from the butchery trade. "I'm only doing your dirty work ; it's such as *you* makes such as *us*," is said to have been the rejoinder of a White-chapel butcher to a gentleman who remonstrated with him for his brutality. Further proof that butchery brutalises men is afforded by crime statistics, which show that crimes are not only more frequent, but more often fatal, amongst butchers than amongst all other classes of workmen. S. H. Beard says, "The effect of butchery in blunting moral sensitiveness is shown by the fact that the number of murders in the United States attributed to butchers exceeds that of any other known vocation." In many states of America there is a law by which a slaughterman is not allowed to

sit on a jury during a trial for murder; the inference is obvious; Americans would not pass such a law without having found good reason for it. Charles Booth writes,¹ "Except the 'bullies,' who live upon and with prostitutes of the lowest type, the slaughtermen, though far from the poorest, are the most degraded class. The simplest and grossest forms of animal indulgence are all they ask from life. The conditions of work have also degrading effects on the young women who are employed in the slaughter-house, and who, from the nature of their task, go by the name of 'gut-girls.' Altogether there seems to be a quite exceptional amount of low-toned life, and the relations between the sexes are at their roughest." The effect on children can be surmised from the fact reported by a lady who did philanthropic work in the Chicago stockyards that the only games which the children play are games of killing.

It may be of interest to briefly trace the connection between flesh-eating and religion. Taking first of all Christianity, the following Old Testament quotations are significant:—

"And God said, Behold, I have given you every herb yielding seed, which is upon the face of all the earth, and every tree, in the which is the fruit of a tree yielding seed; to you it shall be for meat; and to every beast of the earth, and to every fowl of the air, and to every thing that creepeth upon the earth, wherein there is life, I have given every green herb for meat."²

¹ "Life and Labour of the People of London."

² It is evident that the word "meat" in the Bible does not mean the flesh of animals, as it does to-day, but simply "food."

"Every moving thing¹ that liveth shall be food for you; as the green herb have I given you all. But flesh with the life thereof shall ye not eat. And surely your blood, the blood of your lives, will I require; at the hand of every beast will I require it."

"It shall be a perpetual statute throughout your generations in all your dwellings, that ye shall eat neither fat nor blood."—Leviticus iii. 17.

"Speak unto the children of Israel, saying, Ye shall eat no fat, of ox, or sheep, or goat. . . . And ye shall eat no manner of blood, whether it be of fowl or beast, in any of your dwellings."—Leviticus vii. 23 and 26.

"And the mixt multitude that was among them fell a lusting: and the children of Israel also wept again and said, Who shall give us flesh to eat? . . . And say thou unto the people . . . ye have wept in the ears of the Lord, saying, Who shall give us flesh to eat? for it was well with us in Egypt: therefore the Lord shall give you flesh, and ye shall eat. Ye shall not eat one day nor two days, nor five days, neither ten days, nor twenty days; but a whole month, until it come out at your nostrils, and it be loathsome unto you: because that ye have rejected the Lord. . . . While the flesh was yet between their teeth, ere it was chewed, the anger of the Lord was kindled against the people, and the Lord smote the people with a very great plague."—Numbers xi. *et seq.*

¹ The correct translation is said to be "every creeper," signifying all vegetable life; to apply it to every *moving* thing, in the modern sense of the word, would be to include wife, children, neighbours, etc.: the context clearly shows that it does not refer to animals, because "flesh with the life thereof shall ye not eat."

"And there shall come forth a rod out of the stem of Jesse, and a Branch shall grow out of his roots. . . . And righteousness shall be the girdle of his loins. . . . The wolf also shall dwell with the lamb, and the leopard shall lie down with the kid; and the calf and the young lion and the fatling together; and a little child shall lead them . . . and the lion shall eat straw like the ox. . . . They shall not hurt nor destroy in all my holy mountain; for the earth shall be full of the knowledge of the Lord, as the waters cover the sea."—Isaiah lxxv.

"I have spread out my hands all the day unto a rebellious people, which walketh in a way that is not good, after their own thoughts . . . which eat swine's flesh, and broth of abominable things is in their vessels."—Isaiah lxxv.

"He that killeth an ox is as he that slayeth a man."—Isaiah lxxvi. 3.

"And in that day will I make a covenant for them with the beasts of the field, and with the fowls of heaven, and with the creeping things of the ground: and I will break the bow and the sword out of the land, and will make them lie down safely."—Hosea ii. 18.

Although these extracts clearly show that parts of the Old Testament denounce flesh-eating, other quotations could probably be found which give apparent sanction to the custom, for it has been truly said that, by judiciously selecting quotations, almost anything can be proved from the Bible. However that may be, those who eat flesh *because they really believe that their Bible tells them to do so*,

should bear the above quotations in mind, and also Deut. ix. 20, etc.:

“When the Lord thy God shall enlarge thy border, as he hath promised thee, and thou shalt say, I will eat flesh, because thy soul desireth to eat flesh; thou mayest eat flesh, after the desire of thy soul. . . . Only be sure that thou eat not the blood: for the blood is the life; and thou shalt not eat the life with the flesh. Thou shalt not eat it; thou shalt pour it out upon the earth as water. Thou shalt not eat it.”

We have never heard of anyone proposing to eat flesh without the blood, or even suggesting a method by which it might be achieved. The permission to eat flesh *without the blood* savours rather of the story of Shylock, who was allowed to take his pound of flesh on the sole condition that he did not spill a drop of blood.

To pass on to the New Testament. It should be borne in mind first of all that the fact of nothing being recorded of Christ forbidding flesh-eating can no more be held to justify the habit than His silence on other subjects can be held to justify them—*e.g.* war, slavery, intemperance, gambling, swearing, etc. The all-embracing law of love, to friend and foe alike, and the saying, “I will have mercy, not sacrifice,” are clear as general principles and can easily be applied to particular acts. In spite of the silence of the New Testament on this matter, it is recorded that Matthew, Peter, James and James the Less were non-flesh-eaters, while many sects, such as the Nazarenes, Eneatites, Ebionites, Therapeutæ,

Essenes,¹ etc., were well known for their adherence to vegetarian principles. Many also of the early Christians were vegetarians—*e.g.* Tertullian, Basil, Clement of Alexandria, John Chrysostom, Jerome, Origen, Marcion, Callistratus and others, and upheld abstinence from flesh-eating as essential to and characteristic of the true follower of Christ. John Chrysostom, speaking of persons who were fitting themselves for the Christian ministry, wrote: "No streams of blood are among them; no butchery and cutting up of flesh; no dainty cookery; no heaviness of head. Nor are there horrible smells of fleshmeats among them, or disagreeable fumes from the kitchen. No tumult or disturbance and wearisome clamours but bread and water. . . . If, however, they may desire to feast more sumptuously, the sumptuousness consists in fruits, and their pleasure in these is greater than at royal tables."

Very different is the picture of Christianity in modern times. Men pray busily enough for mercy for themselves, but they forget to extend it to weaker creatures: they hear, but understand not, the words of their Master, "Blessed are the merciful, for they shall obtain mercy." What Goldsmith wrote more than a century ago is unfortunately still true of to-day: "The better sort here pretend to the utmost compassion for animals of every kind; to hear them speak a stranger would be apt to imagine they could not hurt the gnat that stung them. They seem so tender, and so full of pity, that one would take them for the harmless friends of the whole creation, the protectors of the meanest insect or reptile that was

¹ Some authorities state that Christ belonged to the Essenes.

privileged with existence. And yet (would you believe it?) I have seen the very men who have thus boasted of their tenderness, at the same time devour the flesh of six different animals tossed up in a fricassee. Strange inconsistency of conduct. They pity, and they eat the objects of their compassion!" "Goodwill towards men, and on earth peace," sing the Christians at Christmas time; but instead of peace on earth, they make the earth a veritable hell for other creatures, celebrating even the birth of the "gentle Jesus" by devouring the bodies of millions of sentient creatures whom they have slaughtered. At harvest time Christians devoutly place in their churches thankofferings of their God-given food—but why do they not put pieces of meat there? Instinctively the suggestion repels them; but if, as they say, God gave them animals to kill and eat as well as the fruits of the earth, what should there be disgusting or repugnant in making a thankoffering of *all* such gifts? Why make an exception of meat, the very food of all foods which so many of them assert is the most important of all, and the most essential for the life of man? Again, why does the average Christian shrink from entering a slaughter-house, when he does not shrink from a grain-mill or a fruit-farm? Why do Christian women of refinement delight in making with their own hands dainty dishes of fruit and corn, but shrink from dressing or handling the dead bodies of animals, and leave such work to menials and underlings? Can any Christian picture the Christ, arrayed in a blood-bespattered smock, wielding poleaxe or knife in the shambles? And yet He would surely not be ashamed to turn

His hand to any useful and *necessary* work *unless it were opposed to the spirit of His teaching.*

It is both interesting and significant that, whatever may or might have been the teaching of Christ Himself on the matter under consideration, other great religious teachers have pleaded for humanity in diet; thus in the Hindu Laws of Manu it is written, "The man who forsakes not the law, and eats not flesh-meat like a bloodthirsty demon, shall attain goodwill in this world, and shall not be afflicted with maladies." The Buddha taught that it is contrary to the spirit of benevolence to slaughter animals for food; Zoroaster is said to have taught the same principle.

It may here be parenthetically mentioned that the phenomenal record of almost complete failure of Christian missionaries in India to convert to Christianity any but the lowest castes (who have powerful social motives for adopting the religion of their masters) is, as Indians themselves say, that the Eastern mind is instinctively repelled by a religion of which the professed advocates are so utterly callous of animal life that they not only kill animals of every kind for food (not excepting even the sacred cow, or the scavenger of the East—the hog), but even take delight in hunting and killing creatures for mere amusement or "sport." "What is religious belief," writes a young Hindu, shocked by the barbarities of Western people, "without love? And what is love that excludes from its embrace the infinitely larger part of living beings?" The doings of Christians are so opposed to the spirit of the great Eastern religions, which teaches men to respect and reverence all forms of life, no matter how small,

because each has its own little purpose to fulfil, that there is little wonder that, as a missionary said in Exeter Hall, these people "have an idea that when a man becomes a Christian, the missionary spits upon him, and makes him drunk and compels him to eat pork or beef." The West is anxious to teach the East many things: the East has also many things to teach the West, and not the least of these is respect for animal life.

To conclude. It is hoped that the few facts mentioned have been sufficient to show that the scruples of humanitarians against flesh-eating are only too well justified by the immense total of animal suffering involved in the use of sentient creatures for food; and that sufficient lines of thought have been indicated to show that what the world is prone to regard as the "maudlin sentimentalism" of humanitarians is in reality based on sound philosophical, moral, ethical, and even religious principles, *being nothing more than carrying to its logical conclusion the principle of humaneness which all refined and cultured people admit should dominate and direct their dealings with creatures lesser and weaker than themselves.* In an age less superficial, less materialistic, and less intellectually arrogant than the present age, a saner view than that taken by the majority of Western peoples to-day would surely have been taken of the ethics of diet, if only for the reason that so many of the greatest thinkers and the greatest characters of history have denounced as barbarous the use of animal flesh for food. A few of these names have already been mentioned ¹; a volume could easily be

¹ Page 55.

filled with their views on this matter. Shakespeare wrote :

“ : : : we do pray for mercy ;
And that same prayer doth teach us all to render
The deeds of mercy ;”

“ Without humanity,” said Voltaire, “ a virtue that comprehends all virtues, the name of philosopher (or Christian) is little deserved.” “ The nobler a soul is,” said Bacon, “ the more objects of compassion it has.”

Looking back with the eyes of future humanity on the civilisation of the present age, we can say with Ruskin, “ We shall be remembered in history as the most cruel and therefore the most unwise generation of men that ever troubled the earth ; the most cruel in proportion to their sensibility, the most unwise in proportion to their science. No people understanding pain ever inflicted so much : no people understanding facts ever acted on them so little.” Voltaire characterises the flesh-eating habits of the day as “ the scandal of Christian civilisation.” Thomas Chalmers wrote, “ The arch-devourer man stands pre-eminent over the fiercest children of the wilderness as an animal of prey. For his lordly and luxurious appetite, as well as for his service, or merest curiosity and amusement, Nature must be ransacked throughout all her elements. Rather than forego the veriest gratifications of vanity, he will wring them from the anguish of wretched and ill-fated creatures ; and whether for the indulgence of his barbaric sensuality or his barbaric splendour, he can stalk paramount over the sufferings of that prostrate

creation which has been placed beneath his feet." "All nature protests," says Michelet, "against the barbarity of man, who misapprehends, who humiliates, who tortures his inferior brethren."

It has been truly said that "vegetarianism is implied in the abandonment of all other cruel usages, and other humane reforms are implied in vegetarianism." Amongst other customs which the increased enlightenment of evolving humanity will inevitably abolish some day—distant though that day may be, for "all great changes are evolutionary, not revolutionary"—is the slaying of defenceless creatures for "sport," which is so dear to the heart of the present-day Britisher, and which Prof. Jevons has described as "the love of the clever destruction of living things." "Make war, if you will," says Michelet, "upon the eagle, but do not hunt and hurt the weak"; and Ruskin, "In the code of unwritten school law, it should be held as shameful to have done a cruel thing as a cowardly one. . . . All infliction of pain on weaker creatures is to be stigmatised as unmanly crime." Cowper speaks of:

"Detested sport
That owes its pleasure to another's pain:
And feeds upon the sobs and dying shrieks
Of harmless nature, dumb, but yet endued
With eloquence that agonies inspire
Of silent tears and heart-distending sighs.
Vain tears, alas! and sighs that never find
A corresponding tone in jovial souls."

"What pleasure," asks Cicero, "can it be to a person of refinement when a noble animal is struck through by a hurling spear?"—let alone an explosive

or expanding bullet from modern weapons, devised with such devilish ingenuity to kill and mutilate.

Let us hope that the time may not be very distant when humanity will discard its present barbarous treatment of the animal world and will see, with Wordsworth, that,

"All creatures and all objects, in degree,
Are friends and patrons of humanity."

and will learn :

"Never to blend our pleasure or our pride
With sorrow of the meanest thing that feels."

"Wherever man goes," says Mrs Annie Besant,¹ "he should be the friend of all, the lover of all, expressing his nature, that is love, in his daily life, and bringing to every lower creature not only the control that may be used to educate, but the love also that may be used to lift that lower creature in the scale of being." Then will dawn that day when man becoming the friend instead of the destroyer of animal life, there will be "peace on earth," when "they shall not hurt nor destroy in all my holy mount," and when :

"No longer now the winged inhabitants,
That in the woods their sweet lives sing away,
Flee from the form of man : but gather round
And prune their sunny feathers on the hands
Which little children stretch in friendly sport
Towards those dreadless partners of their play.
All things are void of terror : man has lost
His terrible prerogative, and stands
An equal amidst equals ; happiness
And science dawn, though late, upon the earth."

¹ See "Vegetarianism in the Light of Theosophy."

Edwin Arnold's beautiful lines in "The Light of Asia," ring with the spirit which will some day find its echo in the hearts of all humanity :

"But Buddha softly said,
'Let him not strike, great king !' and therewith loosed
The victim's bonds, none staying him, so great
His presence was. Then, craving leave, he spake
Of life which all can take but none can give,
Life which all creatures love and strive to keep,
Wonderful, dear, and pleasant unto each,
Even to the meanest : yea a boon to all
Where pity is ; for pity makes the world
Soft to the weak and noble to the strong.
Unto the dumb lips of his flock he lent
Sad, pleading words, shewing how man, who prays
For mercy to the Gods, is merciless,
Being as God to those : albeit all Life
Is linked and kin ; and what we slay have given
Meek tribute of the milk and wool, and set
Fast trust upon the hands that murder them.

While still our Lord went on, teaching how fair
This earth were, if all living beings be linked
In friendliness, and common use of foods,
Bloodless and pure—the golden grain, bright fruits,
Sweet herbs, which grow for all, the waters wan,
Sufficient drinks and meats—which when these heard,
The might of gentleness so conquered them,
The priests themselves scattered their altar-flames
And flung away the steel of sacrifice ;
And through the land next passed a decree
Proclaimed by criers, and in this wise graved
On rock and column : thus the king's will is—
'There hath been slaughter for the sacrifice,
And slaying for the meat, but henceforth none
Shall spill the blood of life, nor taste of flesh ;
Seeing that knowledge grows and life is one,
And mercy cometh to the merciful.'

CHAPTER XXV

CONCLUSION

AS was said in the Preface, the object of this book has been *primarily* to arouse interest, by showing its practical importance to every individual, in the whole subject of feeding the human animal; and only *secondarily* to indicate and suggest what, in the opinion of the writer, appear to be some of the leading principles underlying a sound system of human nutrition.

Taking a broad, comprehensive view of this matter, three facts stand out clearly and strongly: *first*, that the physical health of the people of Great Britain as a whole is at present far from being satisfactory, or a credit to our boasted civilisation or the achievements of our science; *second*, that the nature, quantity, and mode of administering the food and drink out of which men's bodies are manufactured, and from which their energies are derived, must be a factor of fundamental importance in determining the health, the state of which exerts such a powerful influence on general well-being and happiness; and *third*, that the way in which the vast bulk of the nation feeds itself is fundamentally unsound, and opposed to the teachings of science and the dictates of common-sense.

Assuming, therefore, that physical health, *not necessarily as an end in itself, but as a means to an end*, is worth possessing and worth striving for, it follows

from these three facts that the problem of how to feed the human animal correctly and scientifically, so as to obtain from it a maximum of efficiency, is well worth the attention and study of every individual, and one of which the solution should not be left to chance or caprice but should be determined by reason and intelligence. "So important a matter," says Dr Lahmann, "as feeding, the foundation and mainspring of bodily and mental, individual and social, health, deserves the best work of the highest minds." "The nutrition of man," says Chittenden, "if it is to be carried out by the individual in a manner adapted to obtaining the best results, involves an intelligent appreciation of the needs of the body under different conditions of life, and a willingness to accept and put in practice the principles that scientific research has brought to light, even though such principles stand opposed to old-time traditions and customs." Ay, "old-time traditions and customs"—there's the rub. Disraeli knew the English people well when he said that they "are governed by their customs as much as by their laws." "Custom is the plague of wise men," runs the proverb, "and the idol of fools."

In the present state of popular education and thought, which appears to look upon eating and drinking mainly as a means of getting enjoyment out of life, this view is of course apt to be regarded as pedantic—or, to use the correct slang, "cranky." All practical applications of knowledge and science, however, which are in advance of the common level of the masses, have to pass through this stage before the public becomes sufficiently educated to accept them, and the peculiar and unorthodox becomes the

commonplace and orthodox. Thus, for example, if, a very few generations ago, a man with the knowledge of to-day had attempted to be as particular as educated people are to-day about the drainage of his house, the ventilation of his rooms, the washing of his body and his clothes, and so on, he would no doubt have been ridiculed as a pedant and a "crank." Although, therefore, to-day most people label as a "crank" a man who attempts to bring to bear upon the problem of feeding his own body the same care and thought which he exercises in feeding his cattle, we think the time will undoubtedly come when it will be looked upon as foolish and suicidal to allow the nourishment of one's body to be determined by the whims of custom and convention—which in this connection are often simply other names for ignorance—and by the dictates of a capricious palate, instead of by reason, intelligence and knowledge.

Let it be emphatically stated, however, that it is not for a moment suggested that every man, from being an ignoramus on food matters, should become a physiologist or chemist. All that is suggested is, that a general working knowledge of how to feed oneself correctly and healthily should be accorded its proper place, and proportionate weight attached to it, *neither more and neither less*, amongst the other branches of knowledge which are recognised as forming part of the educational equipment which enables men to play their parts in the community efficiently, and with profit to themselves and to others. "A knowledge of the elements of an economic nutrition," says Horace Fletcher, "should be the first essential of a family or school training."

In matters of their personal nutrition the British people, among others, have diverged, principally through ignorance, so far from the course marked out for them by nature, and have in consequence been so severely punished by sickness and disease that, if the present physical deterioration, against which physiologists, physicians and scientists have been warning the nation for so long, is to be checked, it is imperative that the interest of the nation be aroused in the problem of feeding its citizens soundly and healthily. "Nature's greatest gift," says Sidney Beard, "is not to be obtained haphazard and without thought and effort."

Although the problem of nutrition is in its technical aspect a matter more for physicians and physiologists than for laymen, yet, being of such intimate importance to every man individually, it is too vital a question to be left entirely in the hands of so-called experts. Every man cannot keep an expert always with him to advise him how to feed himself; "it is time," says Horace Fletcher, "for the layman to become his own scientist in regard to his personal economics and efficiency." Moreover, although in a nation of perfectly healthy men individuality would probably be nothing like so powerful a factor, yet the feeding of most English people to-day is so largely determined by individuality that it is quite as much a matter for personal observation as for the expert advice of a physician. Hence the saying, "Every man at forty is a fool or a physician."

It should also be borne in mind that, although fortunately the medical profession is turning its attention more and more to the study of the correct

use of food, yet "the study of food in relation to health is a branch of medical science as yet in its infancy. . . . Has not the doctor been taught to study drugs for the cure of disease rather than food as the basis of health?"¹ (Mrs EARLE). Sir Michael Foster says, "It is of great importance that the lay public should be disabused of the idea that medical science is possessed of final information concerning questions of nutrition. This is very far from being the case. Human nutrition involves highly complex factors, and the scientific basis for our knowledge of the subject is small; where questions of diet are concerned, medical teaching, no less than popular practice, is to a great extent based upon empiricism."

Although men have searched high and low, and have ransacked the earth for cures for "the ills that flesh is heir to," the utter inadequacy of such cures, even when found, to eradicate, though they may palliate, disease, is gradually forcing men back upon the conviction that disease, in all its multiplicity of forms, arises from the violation of a few of Nature's simple laws; that health, or "ease," is the normal condition, the birthright of every living creature, "dis-ease" being a negative condition arising from violation of the laws of health laid down by Nature for the preserva-

¹ The public seems to be quite as much to blame for this as the doctors. Dr Forbes Ross recently said, "The public only pay doctors for knowledge connected with disease, and see no object in paying medical men to maintain them in a state of health. We doctors, therefore, are compelled to give more attention to the questions of disease, for which the public pay. If the public will change this standard of market value, so will the doctors."

tion of her creatures; and one of the ways in which those laws are most frequently and most flagrantly transgressed is that of eating and drinking. The science of the physician (as distinct from that of the surgeon) thus tends to simplify itself enormously; as Du Prel says, "Nature is more simple than our conception thereof; we begin with very complicated theories and end with the most simple." But man is arrogant and too often is loth to give up his complicated theories and accept the simple home truths of Nature; "it nettles man," says Goethe, "to find that truth should be so simple."

In food reform, as in so many of the movements now being urged by progressive minorities for the benefit of mankind, it is the need for educating, for spreading knowledge, that is wanted most of all. The almost universal ignorance amongst English people on matters affecting their personal nutrition is little short of phenomenal, and certainly does not reflect well on our boasted civilisation and progress; well may the African monarch King Khama have said, "You English take great care of your goods, but you throw away your children"—he might with equal truth have said, "You throw away your citizens." Much good is being done in spreading knowledge by the various vegetarian and other societies, which are slowly but surely exerting their influence on the thought of the times. A valuable suggestion has been thrown out that the state should interest itself in this matter of the feeding of men. In America, experiments have been made on the feeding of soldiers, under the direction of Prof. Chittenden, as briefly related in Chapter XII. Why should similar

experiments not be made in the British army? No better subjects could be found than soldiers, accustomed as they are to discipline and supervision; and, moreover, if the experiments were conducted as Chittenden's were conducted, there should be no difficulty in securing intelligent co-operation from the soldiers themselves, who, as has been seen, are not called upon to undergo anything in the nature of privation, but rather have everything to gain personally from the experiments. Major Blackham, of the Royal Army Medical Corps, says¹ that "this work of Prof. Chittenden is so important that it deserves to be carefully studied not only by medical officers, but also by their regimental comrades"; and he "ventures to indicate that this is a line of study in which military physicians" (or even ordinary regimental officers) "might do some epoch-making work." Apart from the benefit to the general health of the army, which, judging by the analogy of Chittenden's experiments, would accrue, there would also, if troops could be made to live on a ration approximating to Chittenden's scale instead of on the present undoubtedly excessive ration, be obvious advantages from the point of view of economy, especially in the field, where the saving of transport on rapid expeditions, on forced marches, in sieges, etc., would be very great.

While on this subject it may be mentioned that the present army ration leaves much to be desired, from the food reformer's point of view. The substitution of wholemeal for white bread (see quotation

¹ "The Feeding of the Soldier," in *The British Medical Journal*, 8th August 1908.

on page 152) is only one change which promises beneficial results; another would be the varying of the everlasting bully-beef with other foods, which are even more nutritious than beef. Major Blackham says, "Monotony of diet produces a condition of gastric disorder which appears to predispose to enteric fever and dysentery." Dr Newman says, "Cheese is much better food than beef, and weight for weight yields three times more calories than lean beef, and equal nourishment can be obtained from cheese as from beef at one-sixth the cost. On the whole cheese is one of the very best of all our common articles of food." Then there is pulse, to the splendid sustaining powers of which our Indian troops can testify: oatmeal is described by Hutchison as the most nutritious of all cereals; Major Blackham says that "it forms part of the peace ration of the Russian soldier, and of the service ration of the German. It is occasionally issued to the Austrian soldier in barracks, but is not in favour in any other European army."

If experiments on nutrition were made in the British army, apart from the intrinsic benefits which there is every reason to believe would accrue to the army itself, the results would undoubtedly appeal to the general public, and do more towards stimulating interest in this important question than the efforts of a few societies and isolated individuals.

Seeing that much misunderstanding exists as to the rationale of food reform, it may perhaps be well to indicate the broad basis on which its ideals rest. That basis is, briefly, that, however man be regarded, he is dependent for existence and activity on this plane on his physical body, and the state of that body

determines, not only his physical health and comfort, but also influences, to a degree differing within wide limits with different individuals, the state of his emotions and feelings, of his thoughts, and even of his higher nature. "I believe," says Mrs Bramwell Booth, "that among all classes the intimate relations which exist between the physical and moral nature of man are seldom realised. We cannot divide a human being into watertight compartments, and say the body has nothing to do with the mind, and the mind has nothing to do with the body." "We must not," says Mrs Despard, "minimise the importance of the human body, as many people are apt to do to-day, forgetting that the best work can only be done by the best instrument; that the finest mind, the truest spirit, the firmest will, are powerless to do the best work without a well-developed physical body." Oliver Wendell Holmes wrote, "Most assuredly I do believe that body and mind are influenced by the kind of food habitually depended upon." Prof. Chittenden says, "Lack of a proper physiological condition of the body is more broadly responsible for moral, social, mental and physical ills than any other factor that can be named. Poverty and vice on ultimate analysis may often be traced to a perversion of nutrition." "Physiology first, gentlemen," once said a great man. "Nature herself forbids," wrote John Stuart Mill, "that you should make a virtuous nation out of an ill-fed one." Half the labour is wasted in trying to educate men and to teach them high philosophy and religion when their bodies are hungry and their brains starved for want of wholesome nutriment. "For centuries," says S. H. Beard, "our churches

have been attempting the task of saving men's souls whilst leaving their bodies to riot in physical transgression and carnal indulgence. The important fact has been too long ignored, that sanity of mind and true morality are the normal results of perfect physical health; and that a very large percentage of our popular sin and folly are the direct outcome of perverted, neurotic and abnormal physical conditions." Long ago Prof. Tyndal wrote, "The morality of clean blood ought to be one of the first lessons taught by our pastors and masters. The physical is the substratum of the spiritual, and this fact ought to give the food we eat, and the air we breathe, a transcendental significance."

Horace Fletcher says, "Living is easy and life may be made constantly happy by beginning right; and the right beginning is none other than the careful feeding of the body." Without going so far as to say that happiness necessarily follows from a properly fed body, we can at least agree that there are few who can live happy lives when their bodies are not healthily nourished, and that to keep the body in clean, sound health forms a very good beginning, not only towards making happiness possible, but also towards making us efficient and useful, both to ourselves and to others, in whatever task we may undertake in the world.

APPENDIX I

PERCENTAGE COMPOSITION OF FOODS

FOOD SUBSTANCE	Proteid	Hydro-carbons or Fats	Carbo- hydrates or Sugars and Starches	Mineral Salts	Water	Total Solid Nutri- ment
CEREALS—						
Wholemeal Flour .	11.4	2.2	71.7	3.0	11.7	88.3
White Flour . .	11.2	1.2	73.6	0.8	12.1	86.8
Cornflour . . .	9.3	5.0	66.5	2.0	14.2	82.8
Oatmeal	15.6	6.1	63.6	3.0	10.4	89.1
Barley	6.7	1.3	75.5	1.1	14.6	84.6
Bran	16.4	3.5	43.6	6.0	12.5	69.5
Rice	7.8	0.4	79.0	0.4	12.4	87.6
Macaroni	11.7	1.6	72.9	3.0	10.8	89.2
Sago, Tapioca, and Arrowroot . . .	1.6	0.6	83.0	0.4	14.0	85.6
BREADS—						
Wholemeal Bread .	6.3	1.2	44.8	1.2	45.0	53.5
White Bread . . .	6.5	1.0	51.2	1.0	40.0	59.7
Hovis Bread . . .	11.1	2.1	42.3	1.1	42.0	56.7
Crust	5.7	1.2	62.6	1.2	17.1	70.7
Crumb	0.7	0.7	43.5	0.8	44.4	45.8
PULSES—						
White Haricots . .	25.5	2.8	55.7	3.2	9.9	87.2
Lentils	25.9	1.9	53.0	3.0	12.3	83.0
Dried Peas	23.8	2.1	58.7	2.1	8.3	86.7
Pea Flour	22.4	2.5	51.3	3.0	14.3	79.2
Green Peas	3.4	0.4	13.7	0.7	81.8	18.2
NUTS—						
Walnuts	15.8	57.4	13.0	2.0	44.5	88.2
Almonds	23.5	53.0	7.8	3.0	6.2	87.3
Filberts	18.4	28.5	11.1	1.5	48.0	59.5
Brazil Nuts	16.4	67.7	6.6	3.3	6.0	94.0
Chestnuts	14.6	2.4	69.0	3.3	7.3	89.3
Cocoanuts	5.5	36.0	8.1	1.0	46.6	50.5
Pine Kernels . . .	9.2	71.5	14.0	0.3	5.0	95.0
DRIED FRUITS—						
Dates	6.6	0.2	65.3	1.6	20.8	73.7
Figs	6.1	0.9	65.9	2.3	17.5	75.2
Prunes	2.4	0.8	68.9	1.5	26.4	73.6
Raisins	2.5	4.7	74.7	4.1	14.0	86.0

APPENDIX I.—*continued*

FOOD SUBSTANCE	Proteid	Hydro-carbons or Fats	Carbo- hydrates or Sugars and Starches	Mineral Salts	Water	Total Solid Nutri- ment
FRESH FRUITS—						
Grapes . . .	1'3	1'7	17'7	0'5	78'8	21'2
Bananas . . .	1'2	0'8	22'9	1'0	74'1	25'9
Strawberries . . .	1'0	0'7	6'8	0'6	90'9	9'1
Apples . . .	0'5	0'5	16'6	0'4	82'0	18'0
VEGETABLES—						
Potatoes . . .	2'2	0'2	21'0	1'0	75'0	24'4
Cauliflower (head) . . .	2'2	0'4	4'7	0'8	90'8	8'1
Leeks . . .	1'2	0'5	5'8	0'7	91'8	8'2
Tomatoes . . .	1'3	0'2	5'0	0'7	91'9	7'2
Carrots . . .	0'5	0'3	10'1	0'9	86'5	11'8
Turnips . . .	0'9	0'1	5'0	0'8	90'3	6'8
CHEESE, MILK, EGGS—						
Cheddar Cheese . . .	28'4	31'0	0'0	4'5	36'0	64'0
Devonshire Cream . . .	4'0	65'0	0'0	0'4	28'6	69'4
Milk . . .	4'0	3'9	5'2	0'8	89'1	14'0
Eggs . . .	14'0	10'5	0'0	1'5	64'0	26'0
FLESH-FOODS—						
Lean Beef . . .	19'3	3'6	0'0	5'1	72'0	28'0
Mutton (medium fat) . . .	14'5	19'5	0'0	0'8	65'2	34'8
Veal . . .	17'0	11'0	0'0	1'0	71'0	29'0
Fat Pork . . .	9'8	48'9	0'0	2'3	39'0	61'0
Chicken . . .	24'3	6'7	0'0	1'4	67'4	32'3
White Fish (sole) . . .	11'9	0'2	0'0	1'2	86'1	13'3
PROPRIETARY FOODS—						
Almond Cream . . .	20'8	54'8	17'2	?	?	?
Benger's Food . . .	1'9	0'0	81'7	0'88	8'5	91'5
Bromose . . .	19'6	24'0	39'4	?	?	?
Devonshire Cream . . .	4'0	65'0	0'0	?	?	?
Fibrose . . .	14'5	5'4	71'4	?	?	?
Grape Nuts . . .	12'3	1'0	78'9	1'80	6'0	94'0
Malted Nuts . . .	23'7	27'6	43'9	?	?	?
Mellin's Food . . .	6'9	0'1	83'7	2'90	6'4	93'6
Nutton . . .	20'0	11'0	12'2	?	?	?
Nuttose . . .	17'1	27'8	14'2	?	?	?
Protose . . .	25'5	14'0	2'8	?	?	?
Proteid Food (E. M.) . . .	35'4	9'2	42'0	7'70	5'1	94'3
Prunus . . .	26'4	32'5	24'5	?	?	?
Nutrogen . . .	23'6	27'2	39'6	?	?	?

APPENDIX II

TABLE OF GRAINS OF PROTEID PER OUNCE

(*From Professor Atwater's Analysis*)

Edible portions only

	Grains per oz.		Grains per oz.
RAW CEREALS—		PULSES—	
Oatmeal . . .	72	Lentils . . .	113
Wholemeal Flour		Dried Peas . . .	108
White Flour		Beans, White . . .	95
Graham Wheat		Beans, Lima or Butter	82
Cracked Wheat		Green Peas . . .	32
Flaked Wheat		German Lentils . . .	9
Rye Meal . .			
Macaroni . .		VEGETABLES—	
Shredded Wheat .		Chipped Potatoes . .	28
Spaghetti . .	54	Cabbage, Curly . .	} 18
Barley Meal		Cabbage, Sprouts . .	
Self-raising Wheat	45	Mushrooms . . .	12
Vermicelli . .		Artichoke . . .	
Pearled Barley		Asparagus . . .	
Hominy . . .	36	Potatoes, Raw or Boiled	
Rice		Spinach	
Cornflour . .	32	Beetroot	
Rye Flour . .	28	Cabbage	
Tapioca . . .		Carrots	
Cornstarch . .		Cauliflower . . .	
Arrowroot . .		Celery	
		Leeks	
		Lettuce	
		Onions	
		Parsnips	
		Sweet Potatoes	
		Radishes	
		Turnips	
COOKED CEREALS—		PROPRIETARY FOODS—	
Water Biscuits .	50	E.M. Proteid Food . .	146
Biscuits of all kinds, av.	45	Prunus	115
Wholemeal Bread		Protose	111
White Bread		Malted Nuts	104
Rolls	41	Nutrogen	103
Rye Bread . .		Almond Cream	91
Graham Bread			
Vienna Rolls	36		
Currant Buns			
Sponge Cake	28		
Fruit Cake . .			
Gingerbread Cake	22		

TABLE OF GRAINS OF PROTEID PER OUNCE—*contd.*

PROPRIETARY FOODS— <i>contd.</i>		Grains per oz.	NUTS (shelled)— <i>continued</i>		Grains per oz.
Nutton		87	Almonds		95
Bromose		86	Walnuts		81
Nuttose		75	Brazil Nuts		77
Fibrose		63	Filberts		68
Grape Nuts		54	Dried Chestnuts		45
Mellin's Food		30	Fresh Chestnuts		28
Devonshire Cream		17			
Benger's Food		8			
DRIED FRUITS—			FLESHMEATS—		
Figs	} 18		Beef, lean		90
Apricots			Beef, med. fat		84
Currants			Chicken	} av.	
Dates	} 9		Fowls		
Prunes			Geese		87
Raisins	} 0		Turkeys	} 85	
Canned Apricots			Lamb, av.		
Do Pineapples			Mutton, av.		72
Do. Pears		0	Pork, av.		70
Marmalade		0	Ham, med fat, av.		68
			Sausages		77-144
			Bacon, med. fat		41
FRESH FRUITS—			FISH—		
Apricots			Smoked Herring		164
Bananas			Shrimps		113
Blackberries			Smoked Haddock	} 104	
Cherries			Sardines		
Currants			Salmon	} 100	
Green Figs			Whitefish		
Grapes			Other Fish, av. of 20		
Lemons			kinds		78
Plums					
Raspberries					
Strawberries			CHEESE, MILK, EGGS—		
Apples			Dutch Cheese		168
Melons			Skimmed Milk Cheese		140
Nectarines			Pale American Cheese		128
Oranges			Cheddar Cheese		122
Pears			Cheshire Cheese		116
Pineapples			Condensed Milk		36
Wimberries			Milk	} 13	
NUTS (shelled)—			Skimmed Milk		
Pine Kernels		152	Butter Milk		
Peanut Butter		132			
Butter Nuts	} 122		MISCELLANEOUS—		
California Walnuts			Cocoa		95
Black Walnuts			Chocolate		54
Peanuts		113	Honey	} 0	
Pistachios		100	Candy		
			Sugar		

APPENDIX III
TABLE OF GRAINS OF MINERAL SALTS PER POUND OF FOOD

Food Substance	Total Salts	Potash K ₂ O	Soda Na ₂ O	Lime CaO	Magnesia MgO	Oxide of Iron Fe ₂ O ₃	Phos- phoric Acid P ₂ O ₅	Sulphuric Acid SO ₃	Silicic Acid SiO ₂	Chlorine Cl
VEGETABLES—										
Stinging Nettle	160.9	51.65	3.85	45.55	11.52	7.68	12.61	13.45	6.49	10.72
Spinach	146.0	24.20	51.50	17.36	9.32	4.89	14.98	10.05	5.60	9.06
Dandelion	133.0	51.80	13.89	26.53	11.14	1.14	10.42	2.98	9.33	3.52
French Turnip	89.6	42.10	5.06	10.17	3.30	0.55	13.08	8.62	0.90	5.90
Cabbage	86.1	33.40	8.15	15.18	3.44	0.59	11.74	7.56	2.18	1.99
Leek (Porret)	85.4	26.20	12.06	8.84	2.49	6.49	14.20	6.27	2.65	2.65
Topinambour	82.0	39.12	8.32	2.69	2.40	3.06	11.47	4.03	8.22	3.17
Cabbage-Turnip	81.9	28.90	5.35	8.97	5.50	2.48	17.02	7.25	2.03	4.06
Horse Radish	75.1	16.49	2.82	6.59	2.65	0.87	30.85	5.79	6.13	3.68
Cabbage-Lettuce	72.1	27.15	5.43	10.56	5.46	3.76	6.62	2.71	5.86	5.52
Summer Endive	68.5	17.32	24.19	8.12	2.97	0.86	7.46	2.65	2.05	2.87
Celery (Stalk)	58.8	25.38	0.00	7.72	3.42	0.88	7.55	3.28	2.26	9.35
Potato	66.5	39.91	1.97	1.75	3.28	0.73	11.19	4.33	1.35	2.30
Carrot	63.0	23.21	13.30	7.15	2.76	0.64	8.12	4.06	1.50	2.89
Cauliflower	58.1	25.70	3.42	3.24	2.12	0.59	11.74	7.56	1.19	2.62
Lettuce	55.3	25.40	5.21	3.34	1.20	0.00	4.71	2.15	0.47	4.73
Radish	51.8	16.57	10.89	7.74	1.63	1.47	5.62	3.34	4.22	1.20
Onion	49.6	16.90	1.26	11.35	2.31	1.15	8.61	2.82	0.48	0.43
Mushrooms	49.0	24.92	0.81	0.49	1.65	0.79	16.50	1.96	3.78	2.24
Asparagus	37.8	9.25	6.45	4.10	1.63	1.38	7.01	2.34	2.19	1.80
Cucumber	27.3	11.22	2.74	1.99	1.13	0.38	5.46	1.89	5.50	9.10
Savoy Cabbage	114.9	31.60	11.70	24.50	4.13	1.99	16.95	9.42		
CEREALS AND PULSES										
Lentils	212.7	73.75	28.70	13.47	5.25	4.25	77.10	0.00	0.00	9.84
Oats	211.5	37.81	3.51	7.61	15.07	2.49	55.76	3.76	82.75	1.98
Barley	188.1	30.73	7.78	1.39	13.59	3.24	61.74	5.57	54.00	0.00
Dried Pea	180.4	77.80	1.77	8.69	14.40	1.50	64.75	6.17	1.64	2.87

APPENDIX III.—*continued*

FOOD SUBSTANCE	Total Salts	Potash K ₂ O	Soda Na ₂ O	Lime CaO	Magnesia MgO	Oxide of Iron Fe ₂ O ₃	Phos- phoric Acid P ₂ O ₅	Sulphuric Acid SO ₃	Silicic Acid SiO ₂	Chlorine Cl
Cereals and Pulses <i>cont.</i>										
Haricot Bean . . .	138.0	65.45	1.67	7.89	11.30	0.78	61.20	5.36	1.06	2.83
Rye . . .	126.7	40.60	1.86	3.72	14.41	1.54	60.40	1.64	1.73	0.61
Wheat . . .	126.7	39.40	2.62	4.11	15.25	1.62	59.75	0.49	2.48	0.40
Millet . . .	116.9	13.30	1.52	0.74	11.24	1.26	25.62	0.28	61.95	0.57
Maize . . .	105.7	31.41	1.16	2.29	16.40	0.80	48.20	0.82	2.21	0.06
Rice . . .	70.7	17.71	2.98	2.63	7.82	1.00	38.00	0.35	1.83	0.09
FRUITS—										
Strawberry . . .	56.6	11.93	16.12	8.05	0.00	3.34	7.83	1.78	6.82	0.96
Cherry . . .	51.1	26.30	1.12	3.82	2.79	1.01	8.15	2.60	4.61	0.09
Plum . . .	46.2	27.32	0.25	4.64	2.52	1.48	6.97	1.77	1.09	0.00
Grape . . .	37.1	20.83	0.53	3.99	1.56	0.14	5.77	2.08	1.02	0.56
Apple . . .	34.3	12.23	18.97	1.40	3.00	0.48	4.69	2.09	1.48	0.00
Gooseberry . . .	29.4	11.37	2.92	3.58	1.74	1.34	5.78	1.73	0.76	0.22
Pear . . .	21.7	11.88	1.85	1.73	1.13	0.23	3.30	1.23	0.32	0.00
NUTS, ETC.—										
Walnut . . .	142.0	44.10	3.19	12.19	18.50	1.87	62.00	0.00	0.00	0.00
Fresh Coconut . . .	67.8	29.81	5.70	3.15	6.41	0.00	11.52	3.46	0.34	9.11
Cocoa Bean . . .	243.5	136.10	5.50	13.23	27.92	0.07	94.10	8.45	3.68	2.07
MILK AND EGGS—										
Eggs . . .	78.4	13.59	17.90	8.56	0.88	0.31	29.48	0.25	0.24	7.04
Cow's Milk . . .	50.4	12.40	4.90	11.10	1.50	0.28	14.30	0.15	0.12	7.20
Human Milk . . .	31.5	10.50	2.90	5.20	0.68	0.07	7.14	0.03	0.006	5.78
FLESH FOODS—										
Flesh of Animal ¹ . . .	77.0	31.79	2.79	2.17	2.47	0.54	32.79	1.20	0.86	2.96
Flesh of Fowl . . .	95.9	29.61	17.91	3.12	3.98	0.00	34.88	0.00	0.00	7.71
Flesh of Seafood . . .	114.8	25.00	17.09	17.43	4.48	0.00	39.00	0.00	0.00	12.84

¹ Bloodless, more or less, as usually eaten.

LISTS OF FOODS

ARRANGED IN ORDER OF RICHNESS OF MINERAL SALTS

POTASH		SODA		LIME	
	Grains per lb.		Grains per lb.		Grains per lb.
Cocoa Bean .	136'10	Spinach .	51'50	Stinging Nettle .	45'55
Dried Pea .	77'80	Lentil .	28'70	Dandelion .	26'53
Lentil .	73'75	Summer Endive .	24'19	Savoy Cabbage .	24'50
Haricot Bean .	65'45	Apple .	18'97	Spinach .	17'36
Dandelion .	51'80	Strawberry .	16'12	Cabbage .	15'18
Stinging Nettle .	51'65	Dandelion .	13'89	Lentil .	13'47
French Turnip .	42'10	Carrot .	13'30	Cocoa Bean .	13'23
Rye .	40'60	Leek (Porret) .	12'06	Walnut .	12'19
Potato .	39'91	Savoy Cabbage .	11'70	Onion .	11'35
Wheat .	39'40	Radish .	10'89	Cabbage-Lettuce .	10'56
Topinambour .	39'12	Topinambour .	8'32	French Turnip .	10'17
Oats .	37'81	Cabbage .	8'15	Cabbage-Turnip .	8'97
Flesh of Animal .	31'79	Fowl .	17'91	Seafish .	17'43
Flesh of Fowl .	29'61	Egg .	17'90	Cow's Milk .	11'10
Seafish .	25'00	Fish .	17'09	Egg .	8'56
Egg .	13'59	Cow's Milk .	4'90	Flesh of Fowl .	3'12
Cow's Milk .	12'40	Animal Flesh .	2'79	Flesh of Animal .	2'17

MAGNESIA		OXIDE OF IRON		PHOSPHORIC ACID	
	Grains per lb.		Grains per lb.		Grains per lb.
Cocoa Bean .	27'92	Stinging Nettle .	7'68	Cocoa Bean .	94'10
Barley .	23'59	Leek (Porret) .	6'49	Lentil .	77'10
Walnut .	18'50	Spinach .	4'89	Dried Pea .	64'75
Maize .	16'40	Lentil .	4'25	Walnut .	62'00
Wheat .	15'25	Cabbage-Lettuce .	3'76	Barley .	61'74
Oats .	15'07	Strawberry .	3'34	Haricot Bean .	61'20
Rye .	14'41	Barley .	3'24	Rye .	60'40
Dried Pea .	14'40	Topinambour .	3'06	Wheat .	59'75
Stinging Nettle .	11'52	Oats .	2'49	Oats .	55'76
Haricot Bean .	11'30	Cabbage-Turnip .	2'48	Maize .	48'20
Millet .	11'24	Savoy Cabbage .	1'99	Rice .	38'00
Dandelion .	11'14	Walnut .	1'87	Horse Radish .	30'85
Seafish .	4'48	Flesh of Animal .	0'54	Seafish .	39'60
Flesh of Fowl .	3'98	Egg .	0'31	Flesh of Fowl .	34'88
Flesh of Animal .	2'47	Cow's Milk .	0'28	Flesh of Animal .	32'79
Cow's Milk .	1'50	Flesh of Fowl .	0'00	Egg .	29'48
Egg .	0'88	Seafish .	0'00	Cow's Milk .	14'30

LISTS OF FOODS—*continued*

SULPHURIC ACID		SILICIC ACID		CHLORINE	
	Grains per lb.		Grains per lb.		Grains per lb.
Stinging Nettle .	13'45	Oats . . .	82'75	Stinging Nettle .	10'72
Cabbage . . .	11'98	Barley . . .	54'00	Lentil . . .	9'84
Spinach . . .	10'05	Millet . . .	61'95	Celery (Stalk) .	9'35
Savoy Cabbage .	9'42	Lettuce . . .	11'19	Cocoanut (Fresh)	9'11
French Turnip .	8'62	Dandelion . .	9'33	Savoy Cabbage .	9'10
Cocoa Bean . .	8'45	Topinambour .	8'22	Spinach . . .	9'06
Cauliflower . .	7'56	Strawberry . .	6'82	Cabbage . . .	7'32
Cabbage-Turnip .	7'25	Stinging Nettle .	6'49	French Turnip .	5'90
Leek (Porret) .	6'27	Leek (Porret) .	6'28	Cabbage-Lettuce .	5'52
Dried Pea . . .	6'17	Horse Radish .	6'13	Radish . . .	4'73
Horse Radish . .	5'79	Cabbage-Lettuce	5'86	Cabbage-Turnip .	4'06
Barley . . .	5'57	Spinach . . .	5'60	Horsh Radish . .	3'68
Flesh of Animal .	1'20	Flesh of Animal .	0'86	Seafish . . .	12'84
Egg . . .	0'25	Egg . . .	0'24	Flesh of Fowl . .	7'71
Cow's Milk . . .	0'15	Cow's Milk . .	0'12	Cow's Milk . . .	7'20
Flesh of Fowl . .	0'00	Flesh of Fowl .	0'00	Egg . . .	7'04
Seafish . . .	0'00	Seafish . . .	0'00	Flesh of Animal .	2'96

APPENDIX IV

BOOKS ON THE FOOD QUESTION, ETC.

CHITTENDEN: "The Nutrition of Man." See Chapter XII. A work of great interest and importance to all; the technical portion can be skipped without prejudice to understanding the remainder.

HAIG: "Uric Acid a Factor in the Causation of Disease." 12s. 6d. A bulky volume of 900 pages, mostly too technical for the general reader.

"Uric Acid, an Epitome of the Subject." 150 pages. Suitable for the general reader.

"Diet and Food in Relation to Strength and Power of Endurance." 2s. Suitable for the general reader.

FLETCHER: "The A.B.-Z. of Our Own Nutrition." 5s. See Chapter IX. Of great interest and importance to all: parts are technical, but most is intelligible to laymen.

"The New Glutton or Epicure." A simpler presentation of the same subject.

KEITH AND DEWEY: "Plea for a Simpler Life," by GEORGE KEITH, M.D. 2s. 6d. See Chapter X.

"The No-Breakfast Plan and Fasting Cure," by EDWARD DEWEY, M.D. See Chapter X.

KINGSFORD: "The Perfect Way in Diet." 2s. Generally regarded as the classic of vegetarianism.

BROADBENT: All these books are simple, practical, and suitable for the ordinary reader:

"Health, Strength, and Body Building." 1s.

"Science in the Daily Meal." 3d.

"Fruits, Nuts and Vegetables." 3d.

"A Book about Salads." 3d.

THE PENNY HEALTH LIBRARY:

"Dyspepsia prevented by Diet."

"Bread: Its Influence on Health."

"Constipation prevented by Diet."

"How to keep Warm."

"Dangers in Foods."

"Rheumatism and Gout."

"Children: Their Health and Food."

"Complexions made Beautiful."

"Nervousness and Its Prevention."

"The Secrets of Longevity."

BEARD: "A Comprehensive Guide-Book to Natural Hygienic and Humane Diet." 1s. and 1s. 6d. An exceedingly useful book to food reformers.

EUSTACE MILES: "What Foods Feed Us." 1s.

"The New Cookery." 1s. See Chapter XIV.

"Better Food for Boys." 1s.

"Muscle, Brain, and Diet." 3s. 6d. An excellent work.

MISCELLANEOUS

"The Chemistry of Food and Nutrition," by A. W. DUNCAN. 3d. and 6d.

"The Vegetarian Text-book." 1d.

"Testimony of Science in Favour of Natural and Humane Diet," by SIDNEY BEARD. 1d.

MISCELLANEOUS—*continued*

- "Vegetarianism, all about it," by ALBERT BROADBENT. 1d.
- "An Epitome of Vegetarianism," by C. P. NEWCOMBE. 1d.
- "Manifesto of Vegetarian Principles," by C. P. NEWCOMBE. 1d.
- "The Foundation of all Reform," by OTTO CARQUÉ. 1s. and 2s.
- "The Folly of Meat Eating," by OTTO CARQUÉ. 6d.
- "The Drink Problem: How to Solve it." ½d.
- "The Cancer Problem in a Nutshell," by ROBERT BELL, M.D. 1s.
- "How to prevent Cancer," by ROBERT BELL, M.D. 3d.
- "The Diet Cure of Cancer," by A. P. NEWCOMBE. 3d.
- "Fruits and Farinacea, the Proper Food of Man," by JOHN SMITH. 1s.
- "The Logic of Vegetarianism," by H. S. SALT. 1s. 6d.
- "Papers on Health," by Prof. KIRK. 3s.
- "Natural Hygiene," by Dr LAHMANN.
- "Uncooked Foods," by EUGENE CHRISTIAN. 4s. 6d.

VEGETARIAN RECIPES

- "Comprehensive Guide Book," by S. H. BEARD. 1s. and 1s. 6d.
- "Health, Strength and Body Building," by A. BROADBENT. 1s.
- "Science in the Daily Meal," by A. BROADBENT.
- "Penny Guide to Fruitarian Diet and Cookery," by J. OLDFIELD.
- "Eustace Miles' Restaurant Recipes," by EUSTACE MILES. 1s. 6d.
- "Forty Vegetarian Dinners," by ALBERT BROADBENT. 3d.

VEGETARIAN RECIPES—*continued*

- "Allison's Vegetarian Cookery Book." 1s.
 "Regenerative Food and Cookery," by W. A. and E. WILLIAMS. 1s. 6d.

HUMANITARIAN ASPECT OF DIET, ETC.

- "The Ethics of Diet," by HOWARD WILLIAMS. 1s.
 "The Blood Tribute of Christendom," by S. H. BEARD. 1d.
 "A Tale of Shame and Cruelty," by JOSIAH OLDFIELD. 1d.
 "Is Flesh Eating Morally Defensible?" By S. H. BEARD. 3d.
 "The Festival of the Christians." ½d.
 "Animals' Rights," by H. S. SALT.
 "The Case against Butchers' Meat," by C. W. FORWARD. 1s.
 "The Food of the Future," by C. W. FORWARD. 1s.
 "Concerning Human Carnivorism," by J. TODD FERRIER. 1s. 6d.
 "Every Living Creature," by R. W. TRINE. 1s.
 "The Bible against Flesh Eating," by WILLIAM HARRISON. 1s.
 "The Bible in Relation to Flesh Eating," by BERTRAM MCCRIE. 1d.
 "Is Flesh Eating a Violation of Apostolic Teaching?" by the Rev. J. H. NEVILL, M.A. 1d.
 "Is Flesh Eating sanctioned by Divine Authority?" by Sir W. E. COOPER, C.I.E. 3d.
 "Vegetarianism in the Light of Theosophy," by ANNIE BESANT. 3d.
 "The Failure of Vivisection and the Future of Medical Research," by ARABELLA KENEALY, L.R.C.P. and L.M. 2d.
 "Scientific Research, a View from Within," by STEPHEN SMITH, M.R.C.S.

BOOKS ABOUT ALCOHOL

- "Recent Researches on the Action of Alcohol in Health and Sickness," by G. SIMS WOODHEAD, M.A., M.B. 4d.
- "The Effect of Alcohol upon the Human Brain," by Sir VICTOR HORSLEY, M.B., F.R.C.S., F.R.S. 4d.
- "Labour and Drink," by JOHN BURNS, M.P., L.C.C. 4d.
- "The Economic Aspect of the Drink Problem," by THOS. P. WHITTAKER, M.P. 4d.
- "Alcoholic Poisoning and Degeneration," by Prof. G. BUNGE, M.D., Ph.D. 6d.
- "The Scientific Attitude towards the Alcohol Problem," by G. BASIL PRICE, M.D., B.Sc., D.P.H. 1d.
- "The Verdict of Science upon the Alcohol Question," by Sir VICTOR HORSLEY, Prof. SIMS WOODHEAD and W. McADAM ECCLES. 1d.
- "Alcohol and its Hereditary Effects," by JOHN WISHART, M.D., B.Sc., Ch.B. 1d.
- "The Physical Effects of Alcohol," by Sir FREDERICK TREVES, Surgeon to the King. ½d.
- "Proving our Case," by W. N. EDWARDS, F.C.S. 2s.
- "The Temperance Compendium," a cyclopædia of facts and figures, by W. N. EDWARDS, F.C.S. 1s. 6d.
- National Temperance League Annual.* 1s.
- "Alcohol and Science," by W. HARGREAVES, M.D. 1s. 6d.
- "Moderate Drinking," by Major O'GORMAN, M.D. 1d.

APPENDIX V

FOOD REFORM MAGAZINES

Some of the principal ones are :

The Herald of the Golden Age. Organ of the Order of the Golden Age, edited by S. H. BEARD ; quarterly, 1d.

The Vegetarian Messenger and Health Review. Published by the Vegetarian Society, 257 Deansgate, Manchester ; monthly, 1d.

The Vegetarian. The organ of the Vegetarian Federal Union ; monthly, 1d.

The Herald of Health. Monthly, 1d.

VEGETARIAN AND FOOD REFORM SOCIETIES

Some of the principal ones are :

"The Vegetarian Society." Secretary, Mr A. BROADBENT, 257 Deansgate, Manchester.

"The Order of the Golden Age." President, Mr S. H. BEARD, Paignton, Devon.

"The Vegetarian Association." Secretary, Miss F. I. NICHOLSON, Memorial Hall, London, E.C.

"The Vegetarian Federal Union." Secretary, Miss F. I. NICHOLSON, Memorial Hall, London, E.C.

Lists of Vegetarian and Food Reform Societies, English and Foreign ; Schools where Reformed Diet is provided ; Vegetarian and allied Journals ; Vegetarian Sanatoriums, Hydros, Homes, and Houses, English and Foreign ; Vegetarian Restaurants ; Vegetarian and Health Food Stores and Dealers (price lists on application) ; and other in-

formation useful to food reformers and others, are all to be found in *The Food Reformers' Year Book and Health Annual*, 1908. Edited by H. B. AMOS. Price 2d. Obtainable from RICHARD J. JAMES, Health Publication Depot, 3 and 4 London House Yard, Paternoster Row, London.

HEALTH FOODS

Some of the best-known dealers in health foods are :

The Vegetarian Society's Stores, 257 Deansgate, Manchester.

The Pitman Stores, 121-131 Aston Brook Street, Birmingham.

The International Health Association Ltd., Stanborough Park, Watford, Herts.

The Eustace Miles' Restaurant Company Ltd., 40-42 Chandos Street, Charing Cross, London, W.C.

George Savage & Sons, Nut Experts, 53 Aldersgate Street, London, E.C.

Mapleton's Nut Food Co. Ltd., Wardle, Lancashire.

The Wallace P. R. Foods Co., 465 Battersea Park Road, Battersea, S.W.

VEGETARIAN SOAPS

The manager of the great Beef Trust once said, "Tuberculous and diseased animals are not used for food, they are made into soap." Many soaps being now made by the "cold process," the disease germs would not be destroyed thereby. Ordinary soaps are also made with soda, which is said by many to be a frequent cause of irritation to the human skin.

Soaps containing no animal fats, but made from pure

vegetable sources, the ash of plants being employed in place of soda, can be obtained from M'Clinton's, Donaghmore, Ireland.

Prof. Kirk says also that this soap, "being made from the ash of plants and not from soda, is much less liable to shrink and harden flannel; in fact, it is best for all fine washing."

Other makes of soaps are on the market, which are made from olive and other vegetable oils, instead of animal fats.

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